Chemical Industries

SEPTEMBER 1950

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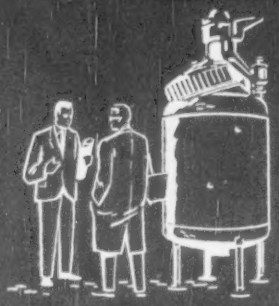
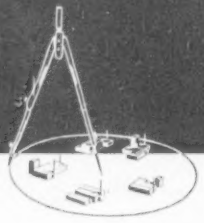
Cover: Belching stacks evoke lawmakers' wrath

EXTRAS···





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★ DEPENDABLE SOURCE FOR BOTH ALKALIES AND PHOSPHATES

and NEW convenient form . . . a 50% solution now available in tank car quantities . . .

● Increased production—using improved methods—has made possible new low prices on Mathieson Sodium Chlorite. And, with the new, easily handled 50% solution, it is now economically feasible to use this powerful and unique oxidizing agent in many more processes.

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SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Chemical Industries

Including CHEMICAL SPECIALTIES

Vol. 67, No. 3

SEPTEMBER 1950

The Business Magazine of the Chemical Process Industries

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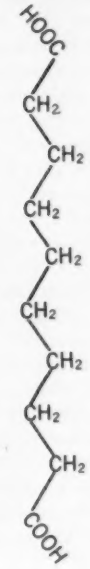

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To All CI Readers:

With this issue CHEMICAL INDUSTRIES becomes a McGraw-Hill publication. Its purchase from Maclean-Hunter became effective August 1, 1950, and its editorial, circulation and advertising offices have since been moved to the McGraw-Hill Building, 330 West 42nd Street, New York 18, N.Y.

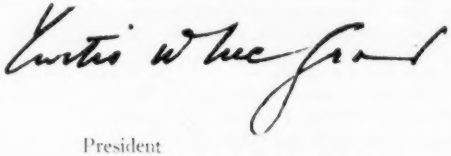
As CI readers you are interested in the news behind the news. So I am taking this means to amplify the bare announcement of the transaction and to tell you what we hope this move will mean to you personally in expanding and improving your sources of business information.

For forty-eight years McGraw-Hill has served chemical engineers, production men, and technically trained management in the chemical process industries. This service, through *Chemical Engineering* and its predecessors, will be continued and expanded.

For thirty-six years CHEMICAL INDUSTRIES and its forebearers have provided a different and valuable editorial service for men engaged in the business management of the companies that manufacture and distribute the products of the chemical industries. Its editorial emphasis has been and will continue to be on the news and economic significance of developments that affect all phases of the chemical field, on news of products and processes, and on news of men and companies whose contributions are shaping the course and future of chemical business and industry.

As companion publications, CE and CI will supplement each other, rounding out and broadening their coverage of this rapidly growing sector of our economy. CHEMICAL INDUSTRIES will now draw on the editorial and publishing resources of McGraw-Hill's vast "network of industrial communication." It will have the benefit of the economic and marketing services maintained by the world's largest publisher of business and technical magazines and books. With these facilities and resources at our command, the publishers of CI recognize an opportunity as well as an obligation to supply you in concise, readable form with the essential information you need to function most efficiently in your jobs as leaders in America's No. 1 industry.

My associates, Wallace F. Traendly, publisher of *Chemical Engineering,* and Sidney D. Kirkpatrick, its editorial director, will serve in like capacities for CHEMICAL INDUSTRIES. Your new editor, as announced elsewhere in this issue, will be W. Alec Jordan, formerly news and later managing editor of this publication. Associated with him is a strong team of staff editors, each with his own background of industrial experience in the field. These men join with me in McGraw-Hill's pledge to continue and constantly improve the services you have learned to expect from "The Business Magazine of the Chemical Process Industries."



President
McGraw-Hill Publishing Co., Inc.

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All Chromium

It has been estimated that the total area of chromium plate applied to 1949 automobiles would provide a ribbon one yard wide stretching completely around the world at the equator. Here is dramatic evidence of the extent to which automobile designers have adopted chromium plating since its introduction about twenty-five years ago. In that period, Mutual Chemical Company of America has supplied the automotive industry with Chromic Acid of high purity.

While chromium plating offers an example of a spectacular use for chromium chemicals, these versatile products find important applications in many other branches of industry where the ultimate consumer is rarely aware of their use. Leather tanning and pigment manufacture are important examples, while metal treatment and corrosion prevention require constantly increasing quantities of chromates.

Mutual's Research Department is continuously alert to new applications of chromium chemicals as well as to improved methods for their use. One of our recent publications is entitled, "Regeneration of Chromic Acid Solutions by Cation Exchange." Copies of this booklet, bearing Mutual's Serial No. 65, are available on request.

SINCE 1845

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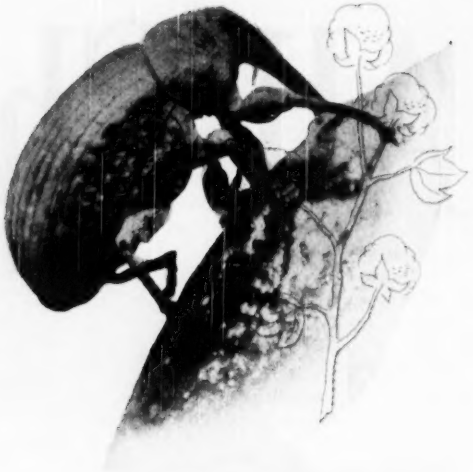
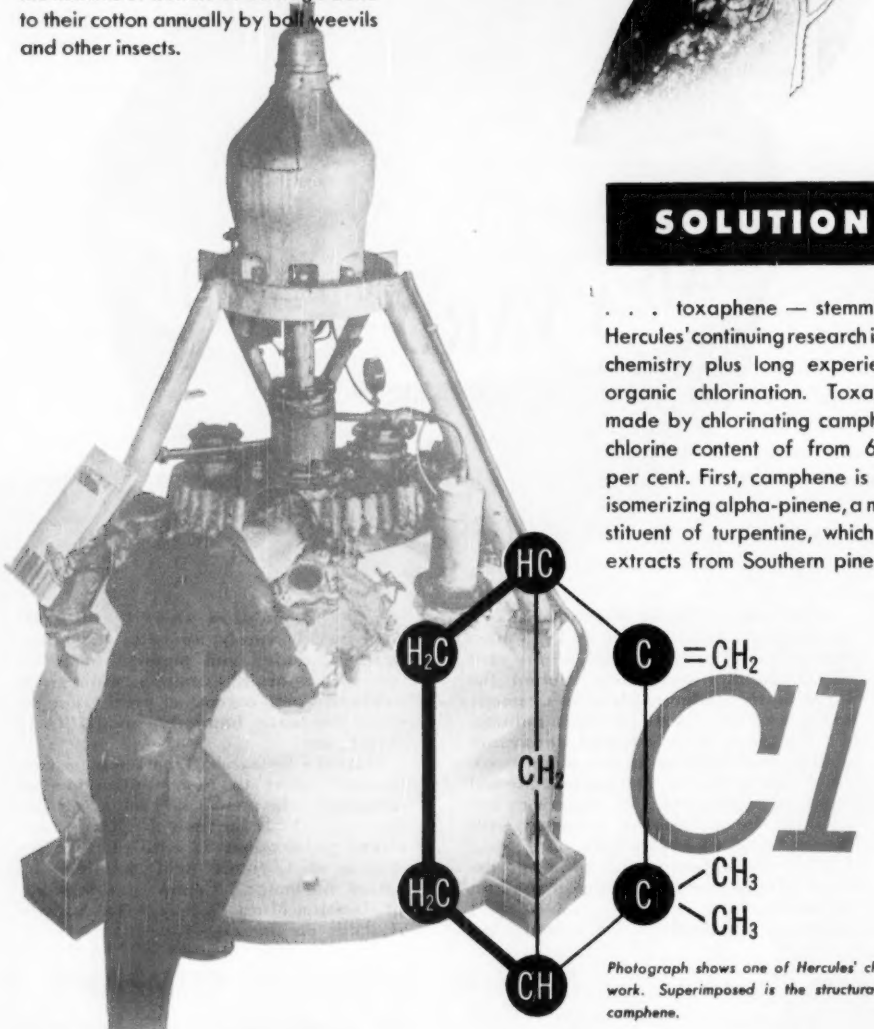
PROBLEM...

. . . to develop a low-cost, highly potent toxicant for an insecticide that would help Southern farmers reduce the millions of dollars of damage done to their cotton annually by boll weevils and other insects.



SOLUTION...

. . . toxaphene — stemming from Hercules' continuing research in terpene chemistry plus long experience with organic chlorination. Toxaphene is made by chlorinating camphene to a chlorine content of from 67 to 69 per cent. First, camphene is made by isomerizing alpha-pinene, a major constituent of turpentine, which Hercules extracts from Southern pine wood.



Photograph shows one of Hercules' chlorinators at work. Superimposed is the structural formula of camphene.

HERCULES SYNTHETIC RESINS · CELLULOSE PRODUCTS · TERPENE CHEMICALS

What Next in Terpene Chemistry?

Team research on camphene and chlorine produced toxaphene. The experience of three decades of terpene chemistry, working with the hydrocarbons, alcohols, ketones, and ethers found in pine wood, has helped to enlarge greatly the uses of terpene materials.

Once used principally for their flavoring and perfuming values, today Hercules terpenes are still a source of perfumes—but they are also widely used in disinfectants, flotation agents, paints and varnish, solvents and thinners, laundry aids, textile processing aids, cleaning compounds, essential oils, soaps, and others.

You may not be directly concerned with insecticides, but what Hercules has done or is now doing to develop new and better uses for the many derivatives of the Southern pine could have an accelerated effect on your product development program. Hercules welcomes the opportunity to put its long experience in terpene and rosin chemistry to work for you.

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RESULT...

. . . economical insecticide dusts and sprays that have reduced losses from harmful insects. Toxaphene-base insecticides are now recommended for control of cotton insects, grasshoppers, and many other insect pests that destroy crops. Farmers will use many millions of pounds this year.

When The Heat's On

Hercules Pentalyn® K, based on a new polymeric resin acid, is now available in quantity. "Pentalyn" K is an ester of pentaerythritol. It combines an unusually high softening point with excellent solubility, and low viscosity in low-cost aliphatic solvents. Softening point (Hercules Drop Method) 190°C; softening point (Ball and Ring) 172°C; acid number 20. It is broadly compatible with waxes, and natural or synthetic rubbers.

The unusual combination of advantages inherent in "Pentalyn" K make it particularly useful in heat-set printing inks and in rubber based adhesives where strength and delamination resistance is required at elevated temperatures.

New Ether-Ester Acetate

A new Hercules cellulose product, Hydroxyethyl Cellulose Acetate—a triacetate—is now available on a limited commercial scale.

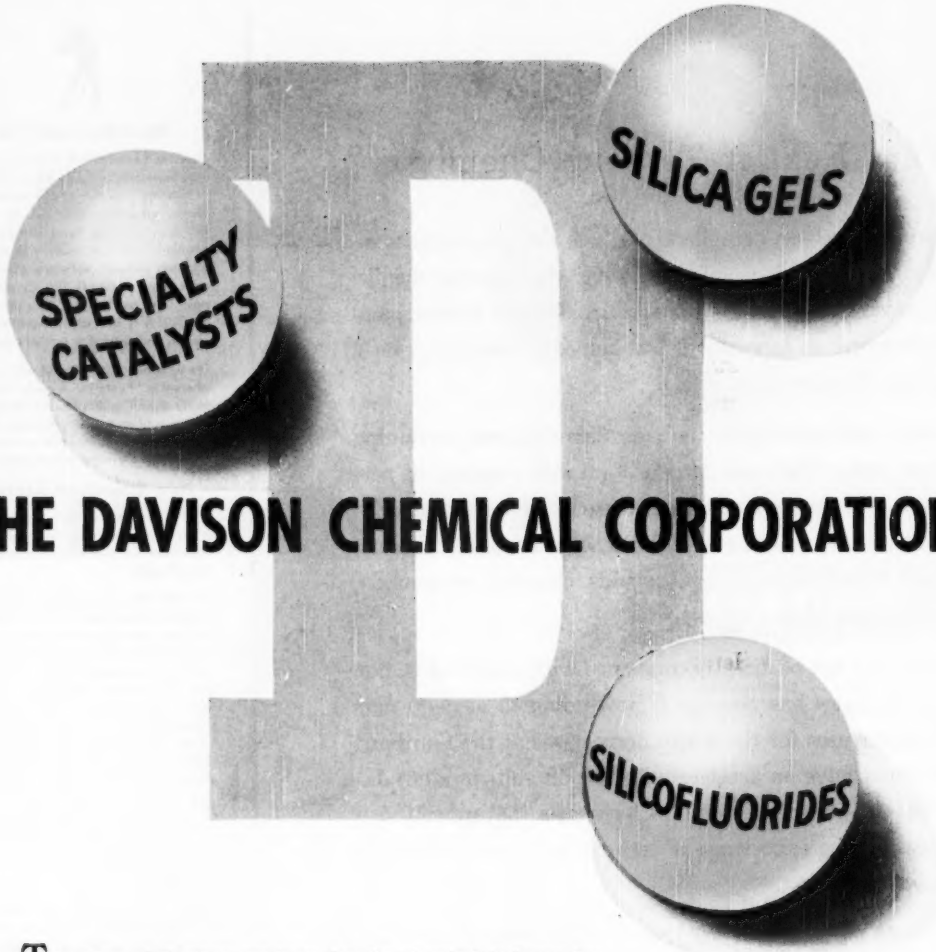
This new ether-ester offers a whole new range of properties, substantially different from those offered by cellulose acetate. For example, solubility in acetone. Made in tasteless flake form, it is colorless and odorless, soluble in 1-4 dioxane, ethyl acetate, 1-nitro propane, chlorinated hydrocarbons, and mixtures of the last named with alcohols. It is insoluble in alcohols, higher esters, aliphatic hydrocarbons, greases and water.

Films of the new material have good tensile strength, elongation and flexibility, offer better water resistance than cellulose triacetate, plus superior weather resistance.

Potential uses for the new triacetate may be found in the manufacture of protective coatings, printing inks, artificial bristles and fibres, or in the making of wrapping or photographic film, and light transmitting reinforced window glazing for solaria, hen houses and safety areas.

Variety of Uses for Amines

Hercules Rosin Amine D—a primary amine consisting of a mixture of dehydro-, dihydro-, and tetrahydro-abietylamines—is finding a widening field of use in industry. The commercial product is a pale-colored, viscous liquid; density at 25°C., 0.997; boiling point (760 mm.), 344°C.; neutralization equivalent, 310-320; purity, 89-93%; soluble in organic solvents, insoluble in water. The major uses for Rosin Amine D and its derivatives are flotation of nonmetallic ores, corrosion inhibitor, asphalt additive, preservative for starch, proteins, and cellulose. Also it and several of its derivatives show promise as fungicides and bactericides for preservation of wood and other cellulose products.



THE DAVISON CHEMICAL CORPORATION

The range of Davison products for the chemical industry has enabled us to help producers with such varied processes as alkylation, polymerization, cracking, dehydration, selective separation, neutralizing, concrete hardening, mothproofing.

These Davison products include: Specialty Catalysts, made to your specifications in the only custom catalyst plant in the country; Silica Gels, with controlled characteristics of surface area, average pore size, mesh size, density; Silicofluorides, providing a source of conveniently available metallic and fluoride ions.

If you have a problem which these products may help to solve, our Technical Service Department will gladly put Davison experience to work for you.

Progress through Chemistry

THE DAVISON CHEMICAL CORPORATION

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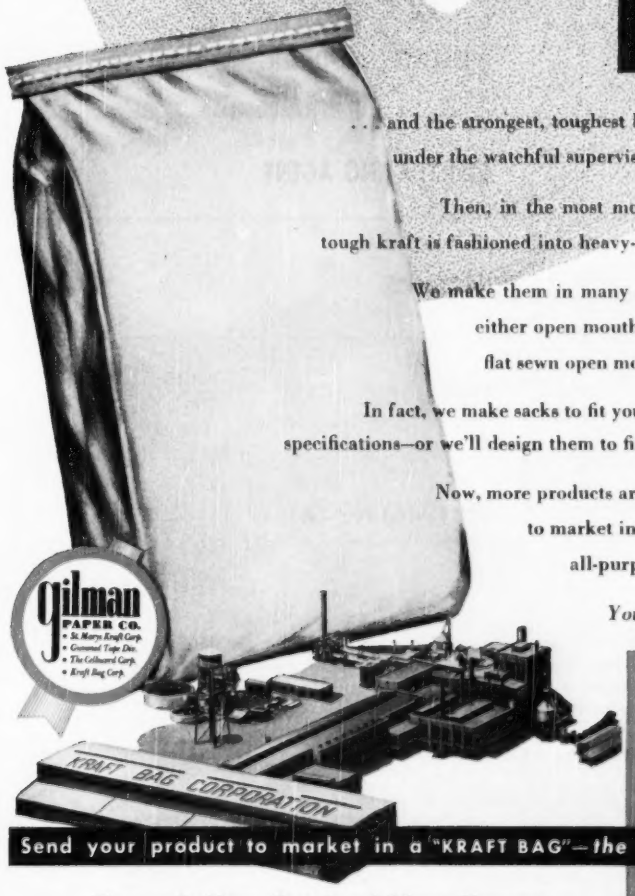
Producers of: Silica Gel, Catalysts, Silicofluorides, Alum, Inorganic Acids, Phosphates, Fertilizer Materials

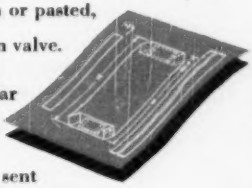
STRENGTH in dependable paper shipping sacks starts with KRAFT



. . . and the strongest, toughest kraft comes from our own mills, made under the watchful supervision of our own master Kraftsmen.

Then, in the most modern plant of its kind, this strong, tough kraft is fashioned into heavy-duty, multi-wall shipping sacks.

We make them in many sizes and many plies, printed or plain, either open mouth or valve, sewn or pasted, flat sewn open mouth or flat sewn valve.



In fact, we make sacks to fit your own particular specifications—or we'll design them to fit special needs.

Now, more products are economically sent to market in the strongest KRAFT all-purpose multi-wall bags yet produced.

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- Gummed Tape Div.
- The Coltboard Corp.
- Kraft Bag Corp.

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Eastman triethyl phosphate is also useful as a specialty solvent and as a deicing fluid.

We will be pleased to send you detailed information and sample quantities of Eastman triethyl phosphate for your evaluation. Write to TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

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CHEMICO
announces
A NEW WAY
to make
Sulfuric Acid

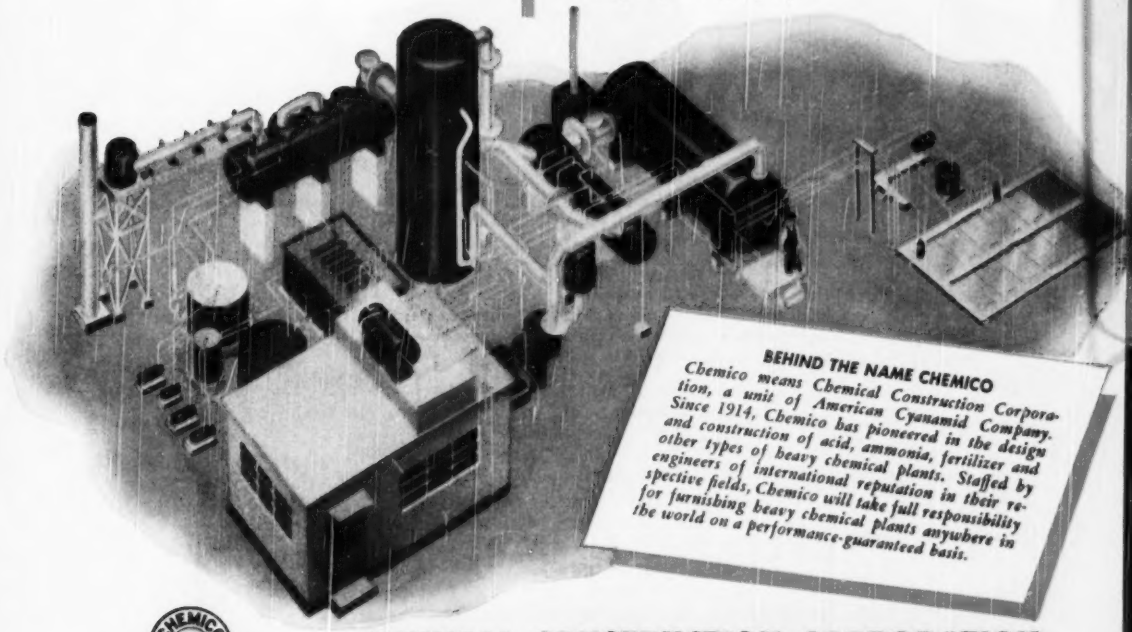
Whether you make or buy sulfuric acid, this simple new-type Chemico plant will be of special interest to you. Here's why . . .

Chemico's new process for manufacturing sulfuric acid from sulfur makes it possible for you to *replace* or *enlarge* your present facilities *at considerably less cost* than for the standard type contact plant.

The simplicity of this new Chemico plant is the basic reason for its low cost. *These seven major items of equipment* — usually found in present-type contact acid plants — *have been eliminated*: drying tower, gas filter, heat exchanger, SO_3 cooler, acid coolers, acid circulating and transfer pumps, and diluting equipment. In addition, the distinctive features listed below assure more efficient production.

DISTINCTIVE FEATURES

- A quench converter eliminates heat exchangers . . . assures higher yield from raw sulfur . . . virtually eliminates atmospheric contamination due to unconverted SO_2.
- A multiple-stage dip-pipe absorption system, operating by gravity flow, eliminates the need to distribute acid over packed absorbing towers.
- Water evaporation from absorber acid solutions removes heat of absorption and the sensible heat of the hot gases. Only the product acid requires cooling before storage.
- A built-in Pease-Anthony Venturi Scrubber insures mist elimination in the exhaust stack.
- Plants of this new type deliver sulfuric acid of any strength up to 95% H_2SO_4.



BEHIND THE NAME CHEMICO

Chemico means Chemical Construction Corporation, a unit of American Cyanamid Company. Since 1914, Chemico has pioneered in the design and construction of acid, ammonia, fertilizer and other types of heavy chemical plants. Staffed by engineers of international reputation in their respective fields, Chemico will take full responsibility for furnishing heavy chemical plants anywhere in the world on a performance-guaranteed basis.

Chemico plants are profitable investments

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which of these "CHEMICAL TWINS" can serve you best in formulating resinous compounds?

NATIONAL FUMARIC ACID

Structural Formula .....

properties

Appearance	White, non-hygroscopic, free-flowing crystalline powder
Melting Point	290-295° C.
Solubility in Water at 25° C.	0.70 gm./100 ml.
Solubility in Water at 100° C.	9.80 gm./100 ml.
Solubility in Ethyl Alcohol at 30° C.	5.75 gm./100 ml
Solubility in Acetone at 20° C.	1.29 gm./100 ml

NATIONAL MALEIC ANHYDRIDE RODS

Structural Formula.....

properties

Appearance	Colorless Rods
Molecular Wt.	98.06
Freezing Point	52.8° C.
Boiling Point (at 760 mm)	199.9° C.
Specific Gravity (solid)	1.48

Solubilities (Gm. per 100 gm. solvent at 25° C.)

in Benzene	50	Alcohol	very soluble (with ester formation)
Toluene	23.4	Kerosene (B.P. 190-250° C.)	0.25
o-Xylene	19.4	Dioxane	very soluble
Carbon Tetrachloride	0.60	Acetone	227
Chloroform	52.5		
Ethyl Acetate	112		

These "twin" stereoisomers differ in physical properties, reactivity and utility by virtue of the different spatial arrangement of their carboxyl groups. Their common high degree of unsaturation makes both useful in the formulation and modification of Resins and Esters. The end-product characteristics desired determine which is to be preferred.

National Aniline does not produce resinous compounds. But as America's leading producer of Maleic Anhydride, Fumaric Acid and other basic resin ingredients, we welcome inquiries for technical data and samples that may develop wider use of

NATIONAL MALEIC ANHYDRIDE RODS
safer and easier to handle, less hydration, lower costs

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
September, 1950

Du Pont's neoprene rubber capacity at Louisville, Ky., is being upped by a substantial amount. Breaking of production bottlenecks in the present plant will account for part of the rise, new construction--which will start within a month-- for the remainder. Louisville is the site spoken of for National Carbide Co.'s proposed $10-million carbide plant (CI Newsletter, August 1950) which, if built, would presumably be the source of acetylene for expanded neoprene output.

The new beta-propiolactone derivative B. F. Goodrich Chemical Co. was readying a few months ago (CI Newsletter, May 1950) is glacial acrylic acid. Prepared in good yield by pyrolysis of the lactone polymer, the material is 97% pure, containing less than 1% water. Cheaper to ship and more convenient to use than an aqueous solution--the only form heretofore available, the glacial acid can be polymerized, copolymerized or esterified in organic solvents. Major use, as indicated by Goodrich's chief customer to date, will be in synthesis of esters for polymers. Current price in ton lots: $1.15 per lb.

* * CI * *

Du Pont's reported use of butadiene as nylon raw material at its new Victoria, Texas, plant lends especial interest to U. S. Patent No. 2,518,608: Du Pont claims the preparation of 1,4-dicyano-2-butene by reaction of hydrogen cyanide with a dihalo addition product of butadiene in the presence of a copper-salt catalyst and an agent to neutralize the hydrogen chloride formed. The product can be hydrogenated, of course, to adiponitrile--precursor of nylon salt.

Now in pilot-plant production at Tennessee Eastman Corp.'s Kingsport plant is a completely new water-soluble cellulosic, sodium cellulose sulfate (SCS). Soluble in both hot and cold water, it is available in high- and low-viscosity types. Possible uses, which parallel those of sodium carboxymethyl cellulose (CMC): detergent additive to prevent redeposition of soil, thickener in emulsion paints, stabilizer for various foodstuffs, sizing agent for textile weaving, and in manufacture of grease- and oilproof papers.

* * CI * *

Another producer—Bakelite's Halowax Division—has joined the ranks of chlorinated paraffin makers. Halowax's products, manufactured at Detroit, Mich., are being used as plasticizer extenders (up to 25% of phthalate-type plasticizers in vinyl resins) and in flameproofing polyethylene. In the latter applications they are used together with antimony oxide to make polyethylene suitable for special electrical uses.

You can expect to hear more about a novel sulfur dioxide package that Virginia Smelting Co. will introduce in about two months. Trade-named Can-O-Gas, the product will be distributed in 16-oz. non-refillable, throw-away cans equipped with a reusable clip-on valve. The new package is expected to compete handily with the bulky 5- and 10-lb. cylinders now commonly used. Major market: refrigeration maintenance men, who are already familiar with the company's similar package for Freon refrigerants.

* * CI * *

Scratch one acetic anhydride producer: Du Pont. Its last operating unit, at Waynesboro, Va., halted production August 14. This unit used the ethylidene diacetate conversion of acetylene to the anhydride.

A new use for nylon is valves for aerosol containers—particularly useful in cosmetic applications where corrosion of the valve has been a problem. They'll be out soon.

* * CI * *

Synthetic tartaric acid is a potential competitor of the "natural" product, much of which is a by-product of wine-making, according to J. M. Church, Columbia University. Raw materials for the synthesis are maleic anhydride and hydrogen peroxide, which react in the presence of tungstic acid to give a high yield of tartaric acid.

Sulfite pulpers and naval stores proessors may turn a profit from a little-used by-product that can be used instead of styrene in polymers. Work done at the University of Texas by K. A. Kobe shows that para-cymene can be dehydrogenated (80% yield, 50% conversion per pass, chrome-alumina catalyst) to alpha,para-dimethylstyrene. This compound copolymerizes with butadiene to give a rubber superior to GR-S in tensile strength and more like natural rubber in its processing characteristics.

* * CI * *

Here and There:

A new aerosol on its way is a nose and throat spray to relieve congestion caused by colds. A big-time maker of cold products is behind it.... Wilbert Products Co., large New York wax manufacturer, has just brought out a silicone car wax called Autoplate....Gas propels a powdered chemical in a new fire extinguisher, called Met-l-X, designed by Ansul Chemical to combat fires caused by metallic sodium or magnesium turnings.

Tennessee Eastman has started construction of an addition to its cellulose acetate filament yarn plant. Scheduled for completion next spring, it will increase current yarn and staple production by about 5 per cent.... Pennsalt has started a $1-million expansion program of its caustic and chlorine capacity at Portland, Ore.

The Editors

Woodworking adhesives, dyestuffs, explosives, pharmaceuticals, medicinals, textile and leather chemicals, and compounds that give increased adhesion of rubber to fabrics and cords are all end products of the reactions of Koppers Resorcinol.

The versatile nature of Resorcinol is the result of its high reactivity; the three hydrogen atoms adjacent to the hydroxyl groups are particularly reactive. As a result, Resorcinol undergoes many interesting and unusual reactions in addition to those typical of phenol . . . reactions which may suggest new and undeveloped commercial possibilities to you.

Koppers offers Resorcinol to you in two grades. Koppers Resorcinol, Technical, for most chemical manufacturing and processing use, is offered in flake form with minimum purity of 98.5%. Koppers Resorcinol, U.S.P., for medicinal and pharmaceutical applications, is in the form of fine crystals with minimum purity of 99.5%.

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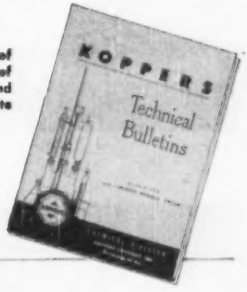

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YOUR NEW EDITOR

AN UNFAMILIAR signature appears at the bottom of this page. Temporarily it replaces that of Robert L. Taylor, who for seven eventful years has guided CI's editorial destinies and who on October 1 assumes his new duties as executive vice-president of the Manufacturing Chemists Association. We are sorry to lose him as a business-paper editor and to me the loss is all the more personal because I gave him his first job when he was graduated from Michigan in 1936. But I am now pleased and proud to announce that Bob Taylor's able colleague and collaborator, W. Alec Jordan, succeeds him as your new CI editor.

Editor Jordan enters his new job with an unusual record in both chemical and publishing fields. His first connection with CI was in September, 1943, when he became your Canadian correspondent, at the same time continuing his technical service and sales work in Montreal. Later he joined the staff in New York as news editor and as he earned additional responsibilities became managing editor and more recently business manager. He contributed importantly to the development of the popular Newsletter and "What's New" department. He has devoted much thought and attention to the editor's problem of presenting essential business and technical news in accurate, concise and readable form.

In the chemical industry Alec Jordan's career has been equally interesting. After graduating in chemistry from McMaster University in 1936, he joined the research department of the Norton Co. at Niagara Falls, Ont., where he worked on the development of boron carbide, special abrasives, ceramic compositions and refractories. In 1940 came an opportunity to join the McKinnon Industries Division of General Motors Co., Ltd., of Canada as assistant chief chemist at St. Catherines, Ont.

But metallurgical work had less appeal than business pursuits, and the young chemist was soon attracted to Montreal by the chance to enroll for special studies in McGill University. Simultaneously he became a member of the technical staff of P. N. Soden & Co., sales representative of major American, British and Canadian chemical manufacturers. It was here that he acquired his broad familiarity with the chemicals of commerce and with the principles and practice of chemical marketing and distribution. This experience was further amplified in a year's tenure as Eastern Manager of Apco Industries, Toronto, manufacturer and distributor of petroleum solvents, alcohols and textile chemicals.

W. ALEC JORDAN

Believing as he does that any successful chemical enterprise must be a happy marriage of science and business, Alec Jordan has well prepared himself to serve the readers of this magazine. In this program he will have the assistance of a competent and experienced editorial staff. Richard L. Demmerle will serve as executive editor, at the same time continuing his special editorial studies and assignments for *Chemical Engineering*. Howard C. E. Johnson, managing editor, and Herman W. Zabel and John J. Craig, associate editors, are already well and favorably known to you for their many excellent contributions to these pages. Each brings to the CI staff a valuable background of industrial as well as editorial experience. And behind them all now stand the extensive editorial resources and publishing facilities of the McGraw-Hill companies.

With full confidence in their character and ability, I commend these men to you as your editors. Under Alec Jordan's capable leadership I know that CHEMICAL INDUSTRIES will continue to grow in stature and in its service to the chemical process industries.

Sidney D. Kirkpatrick

Editorial Director

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3. **Nitroamines**—from NP's, formaldehyde, and amines by Mannich reaction.
4. **Diamines**—(a) reduction of nitroamines (see above), and (b) reduction of dinitroparaffins made by condensing nitroparaffins with ketones, or reacting chloronitroparaffins with alkali salt of an NP.
5. **Cyclic Nitroalcohols**—condensing primary nitroparaffins with cyclohexanone.
6. **Alkyl Hydroxylamines**—formed by mild reduction of primary nitroparaffins.
7. **Heterocyclic Nitrohydroxy Derivatives**—prepared by condensing heterocyclic aldehydes with an NP.
8. **Beta-Dioximes**—condensing three molecules of an NP in presence of a weak base.
9. **Trialkyl Isoxazoles**—hydrolysis of Beta-Dioximes (see above).
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CSC

What's new

TIGHT CHEMICALS: Strikes, shortages and scarred memories.

SELLER IN CATBIRD SEAT

Manufacturers scramble for chemicals as scare buying, shortages, and strikes bring premium prices.

CHEMICAL USERS don't have to look any farther than the ads in the papers to learn the score on supplies: The reseller is back at his old stand.

Sooner or later they'll find every really tight chemical listed there—if any at all is on the market— and available on resellers' lists at prices well above manufacturers' schedules. All this is discouraging enough, but the near future holds little hope of improvement in many of these materials, and basic suppliers too are boosting prices under pressure of rising costs.

For some of the sudden tightening, the buyer of chemicals is himself responsible. The possibility that the Korean conflict would spread jarred him no less than it did the housewife whose memory bears scars of nylonless legs and semi-sweet coffee. So he decided he couldn't chance letting the producer carry his inventory any more, and moved to build stocks against possible lean days ahead. A good deal of glycerine at 20-30¢ a pound above listed prices, phthalic anhydride at 1-1½¢ premiums and 22¢-a-pound ethylene glycol can be attributed to this change in method of operation.

Miserable Nitrite

The alkali strike that has halted production at three Solvay locations and Diamond Alkali's Painesville, Ohio, plant affected the whole line of chemicals whose manufacture depends upon soda ash and chlorine, and even moved certain types of caustic into the tight category. Hardest hit by lack of soda ash is the glass industry. Some soda ash changing hands at 7½-8¢ a pound has been bought by liquor producers to swap for needed bottles. Bichromates, phosphates, sodium nitrate, sodium silicate, and sal ammoniac have been curtailed, and supply of another affected chemical, sodium nitrite, is described as "miserable." Although Solvay's Baton Rouge, La., plant is going at about two-thirds steam with the help of supervisory personnel—and a helicopter dropping supplies for their in-plant bivouac—less than 50% of the nation's ammonia-soda capacity is in operation.

Chlorine is not affected to such a great degree by these strikes, for the plants that are out represent less than 5% of the industry's 5600-ton-a-day capacity. However, the chlorine shortage is the maiden aunt of the chemical industry—it's been with us so long everybody takes it for granted. The novel development is that some forms of caustic soda, a chemical pariah a short time ago, are now tight. Flake is going for about 8¢ a pound on resales, and users of the rayon-grade material, which also has been hit by the strike, are importing it.

Another Regular

Most immediately affected by defense preparations is another perennially scarce commodity, benzene. The Government's order reactivating synthetic rubber plants to make 600,000 tons of GR-S (containing 23% styrene) a year, has sent styrene producers scurrying to Britain to get some of the 32 million gallons of benzene required for such a program. This figure represents a 10-million-gallon increase over that used for the styrene consumed in rubber last year. Over-all benzene requirements for 1951 are set at 20 million gallons more than we have, and we could use 30 million if we could get it. The imported material is costing over 50¢ a gallon, and resale lots are in the 55¢ range.

While the British are helping to ease the benzene squeeze, the same assistance does not seem to be forthcoming in cresylics. Prices of over $1 for imported cresylic acid have been quoted, and indications are that no more will be available for the rest of the year. Current offering are for the early part of next year at a price of $1.20 a gallon. Cutoff of this outside source combined with a strike at one of Koppers Co.'s tar distilling plants means rough weather ahead for users of cresol, cresylic acid, and other basic coaltar materials.

Phenol, big use for which is in phenol-formaldehyde resins, also figures in the benzene hunt, for produc-

tion is limited by lack of sufficient benzene. With styrene for synthetic rubber naturally holding a priority on benzene, no more phenol can be expected and supplies are tightening. Other benzene-derived chemicals such as aniline, maleic anhydride, chlorobenzenes, and nitrobenzene are feeling the same pinch. Conditions are such among the agricultural chemicals hit by both the benzene and chlorine shortage—DDT and benzene hexachloride—that some producers are talking of not booking any new business for 1951.

Farmer Comes to Market

Not only the reseller, but even the farmer has come into the chemical market picture, as a large spread has been established between prices posted by different alcohol producers. This stems from the feed industry's long-term trend toward substituting cheap molasses for expensive corn. Last year, feedstuff producers purchased much of the molasses that alcohol companies failed to take, and this year consumed about half the available crop. Having no molasses on hand and finding none in the market, one fermentation producer has switched to corn and boosted its alcohol to 75¢ a gallon although other makers are selling at 45¢. At this writing the same manufacturer is selling n-butanol at 27¢ a pound; butyl acetate at 28¢; and acetic acid at 14¢. These prices compare with 13¢, 13¢ and 8¢, respectively, for other producers.

With alcohol becoming tight as a result of high chemical demands (for acetic acid and anhydride principally) and solvent requirements (for booming resins, including cellulose acetate which is making hay as styrene is funneled into synthetic rubber), it looks as thought the higher price will prevail. Fermentation producers will have to swing more and more to expensive grain, and those who need alcohol will have to go along with them on price.

Whose Acetone?

Solvent users, incidentally, have different views on whether acetone is tight. It all seems to boil down to a question of whose acetone an individual is using. The story is this: Du Pont has just stopped making its own acetic anhydride at Waynesboro, Va., and is buying it from a synthetic producer—presumably Carbide and Carbon—who makes both acetone and anhydride. The company's flexible operation enables it to sell the acetone or convert it to anhydride. The increase in anhydride for Du Pont at the expense of acetone accounts for the slight squeeze on some buyers.

There is no divergence of opinion on the scarcity of ethylene glycol, another surprisingly short chemical. Just seven months ago when planned construction indicated that we'd have capacity for a half billion pounds a year (*CI, February 1950*), the big question was where it would all go. Of course, most of this added capacity is not yet producing, but still postwar expansion seemed sufficient to prevent such a sudden change in market conditions. However, calculations that there was a lot of glycol-based antifreeze left on retail stores shelves from last season were apparently wrong. Producers who formerly were wringing their hands about the huge carryover are wondering whether there is any worth mentioning. This condition plus the memory of the last war when no glycol was available for permanent-type antifreeze, spurred demand all along the line, and quickly put the material in the premium-price class. With ethanol again priced out of the non-permanent antifreeze market, it looks as though glycol will continue to share the antifreeze business with methanol—base for non-permanent type—which is in relatively good supply.

It would take a pretty good-sized war to seriously affect either methanol, ammonia or formaldehyde. Ammonia capacity is now 300% greater than it was in 1940, and with two more plants under construction, it is unlikely that conversion of methanol units for explosives would be called for.

Different Story

If these few commodies are able to take a war, or even a war scare, in their stride, there are plenty that can't. Basic reason is that the industry was operating at peak capacity before the shooting started. There was no slack to ease the effect of increased demand, both real and scare.

Scare buying could be blamed for the high call for shellac, pigments and nickel salts along with the other chemicals discussed above. Some of this has eased off, but titanium dioxide is still going at fancy prices on resale, and nickel salts are still being allocated by producers.

The market stands to be tight as long as major strikes continue to throw a monkey wrench into the whole productive machinery. With no definitive Government word on chemical requirements, allocations or price controls, it is obvious that chemical buyers will haev to get their materials where they can at the best price they can.

CANNED SUDS

Hair shampoos in pressurized cans reach national markets as aerosol principle invades cosmetic field.

CONVENIENCE has been the big selling point as aerosol dispensers have moved from their original field—insecticides—into room deodorants, waxes, fire extinguishers, spotting agents, and paints. Now comes the ultimate in appeal to those who love easy living: hair shampoos and shaving creams that require no effort to work up a lather. You just push a button and the suds flow out of a can.

FOAM SHAMPOO: No lather to work up.

Shampoo Whip is the name of the hair shampoo that Helene Curtis Industries, Inc., Chicago, has just launched on a national scale. Packaged in a 12-ounce container (Crown Can Co.), it sells for $1, is claimed to take care of one's hair washing needs for a half year. The novelty of the product is a copy-writer's dream, and ads breaking in metropolitan areas bristle with huzzahs for "activated lather" and "atomized lanolin" that "bombard the scalp" as no cream, liquid or soap can. It looks like the biggest thing in this business since cream shampoos became popular a while back.

Other companies have introduced or have under development similar products. Raymond Laboratories, St. Paul, Minn., is marketing its Rayette Foam Shampoo throughout the United States, and Carter Products, New York, is test-marketing its Billow. Carter, whose Rise Shaving Cream was the first of the aerated foam products on the market, has apparently found the public enthusiastic about its substitute

for brush and brushless shave creams, as it is rapidly extending the product's marketing areas. Revlon Products, a big name in the cosmetic field, is holding off until next spring to unveil its Snow Cream shampoo (*CI Newsletter, August 1950*).

Through the Valve

Formulating a shampoo for an aerosol can poses many problems, as corrosion can raise havoc with both valve and can. Filling is a special deal too; the conventional method of chilling both the active ingredients and the propellent mixture, then adding each separately to the can before capping, can't be employed, for the cold foam doesn't flow properly.

Traditionally specialties manufacturers are chary about mentioning their formulas, and aerosol marketers are no exception. However, a few things are known: considerably less than the 80% liquefied gas propellent used in insecticide formulations is employed, and active ingredients suitable for conventional cream shampoos can form the base of the formulation—alcohol sulfates are used in some. To get around the filling problem, the shampoo is added to the can at normal temperatures, the can is capped, and the gas is forced in through the valve.

Those now entering the field are operating in the usual fashion—they go to an aerosol filler or consultant and work out problems of formulation, corrosion, effect of the product on the skin, selection of can, and design or selection of valve. When the product is ready to go, the contract filler does the canning at a given fee. George Barr & Co., Chicago, for example, does the filling for both Helene Curtis and Raymond Laboratories. Other fillers such as Fluid Chemical Co. (Newark, N. J.), Continental Filling Corp. (Danville, Ill.) and Connecticut Chemical Research Corp. (Bridgeport) have similar interests in the business.

Widening Field

Although the foam products seem to have widest application among aerosols in the toiletries field, others recently introduced indicate that manufacturers are not overlooking any possibilities for packaging in such sales-getting containers. Douglas Laboratories, Miami, Fla., has Coppertone Sun Tan Oil and Isofoam sunburn lotion; Dorothy Gray Division of Lehn and Fink Products Corp., New York, has Aeromist Deodorant, a personal deodorant; and there are several colognes on the market.

The above products are packaged in a new aluminum container made by the inexpensive impact extrusion process by the Sun Tube Corp., Hillside, N. J. Currently available in 2- and 4-ounce sizes, these containers answer the need of the cosmetic industry for an attractive container of smaller size than those originally made for insecticides and the like. American Metal Products Corp., Bridgeport, Conn., also is working with cosmetic and pharmaceutical houses with its line of aluminum containers (*CI, January 1950, p. 25*). Crown Can, Philadelphia, has two 6-ounce cans, available in tin or steel, suitable for cosmetics, and other producers, among them Continental Can Co., have similar developments under way.

With such activity in these fields, foam shampoos, shaving creams, perfumes and deodorants should soon blossom in every manufacturer's line, appear on everyone's bathroom shelf. Not only will this move more of the chemicals going into these products, but every woman will soon be familiar with the push-button principle. That means bigger sales tor the already established aerosols too.

RESIN-CLAD WARPS

Resin products gain as warp sizes in weaving yarn into cloth.

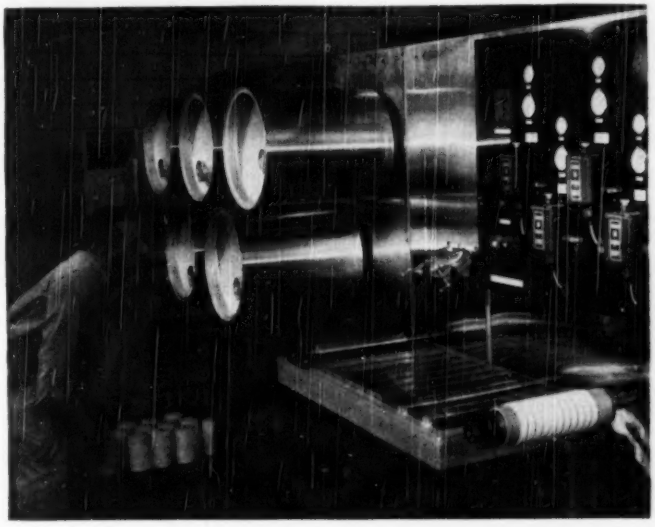
REPLACING a natural material with a synthetic in a given field is a slow process. Progress is doubly slow where processing is complex as in textiles.

Monsanto Chemical Co.'s synthetic warp size Stymer S, first used on large-scale commercial equipment to warp size continuous-filament acetate rayon a little over two years ago, has staged a rapid—for the textile industry—advance into the domain of such natural products as gelatin and casein. The rise of this material and the position of other synthetics among warp sizes for all types of fibers indicate that textile men are tractable when a new product can give them what they want in properties and price. Moreover, with new types of fibers coming in, they are turning to the chemists for new sizes, since the old materials are not suitable.

Why Size?

Why does the warp—the yarns running lengthwise in the loom which, during the weaving process, are interlaced with those running crosswise, called the weft, woof or filling—need to be sized? Basically, to make better cloth. The size functions as a protective film that reduces chafing in the loom, makes the yarn stronger to prevent its breaking during weaving, makes it more resistant to abrasive action, and equalizes differences in tension among warp yarns, making them smooth and preventing loose ends. After the yarn is woven, the material is desized prior to further processing.

Typical compositions used on filament rayon warps comprise an adhesive material such as gelatin or casein; water; a softening agent—usually a



MONSANTO'S LABORATORY SLASHER: Trial runs for resin warps.

sulfonated oil; a body oil such as coconut oil; and a preservative. Many prepared solutions are sold as trade named sizes to mills that don't have facilities to make their own. In preparing a size of a material like Stymer, however, the resin is merely dissolved in the appropriate amount of water, without additives such as penetrants, binders and softeners although they can be added if desired.

Stymers, identified by Monsanto as a synthetic resin with a faint styrene odor, found immediate acceptance first on filament acetate yarn. With the trade estimating that about half of the acetate weavers in the country use Stymer, it is the principal sizing agent in this field. (Du Pont Co.'s Elvanol is another synthetic finding acceptance largely for acetate.) However, in the case of viscose rayon, now dominated by gelatin, processed starches and casein, Stymer is winning customers too.

Although synthetic sizes have been limited to continuous filament yarn—that formed by twisting two or more continuous filaments into one continuous strand—Monsanto reports that Stymer is now being used on spun rayon and spun acetate—yarn spun of filaments cut into uniform lengths for spinning. This does not compare in degree to its use on filament yarn, however. Spun rayon warps (staple fiber) are still treated principally with "converted starches", those starches processed to give a desired degree of solubility.

Synthetics Don't Vary

Advantages claimed for synthetic sizes over the older ones are that they do the job better, are easier to handle and are not subject to variations. Stymer, for example, sizes well, is uniform, scours off readily, and is more ionic than gelatin, thereby cutting down on static buildup on warps. Such problems as setting up in slash boxes do not exist, and there is no sticking to the cans on which the warps are dried. Since less size is required than with gelatin-based products, cost is comparable.

While operational advantages of synthetics have enabled them to win acceptance for the job they can do on man-made fibers, starch still is the choice for warp sizing cotton. This is primarily true because of the large price differential between starch and present day synthetics. However, even here synthetics may find a place since functionally they are likely to be superior to starch. First acceptance will probably be in specialty jobs.

The newer fibers, with the exception of nylon, have not been made in great enough volume yet to present much of a market for warp sizes. Principal product for slasher sizing of continuous-filament nylon warps is Du Pont's own Tyze, a resin based on methacrylic acid. Originally introduced about two and a half years ago, it has since been improved, and gives promise of application on fibers other than nylon. Recently, American Aniline & Extract Co., Philadelphia, went into plant production on its Orthocryl 25 (*CI, June 1950, p. 880*), which has given favorable results as a nylon size in a variety of applications.

These and other companies are working on special sizes for both old and new fibers. As the new fibers bring special problems that natural products can't meet, efforts are being directed at tailoring resins to do these jobs.

EMPHASIS ON FP

Ozark-Mahoning Co.'s fluophosphoric acids approach commercial realization.

COMPLETION of a twenty-fold pilot-plant expansion for fluophosphoric acids, enabling Ozark-Mahoning Co. to supply a 3,000-lb. trial order to an oil company, may mark a new chapter in the development of these little-known but interesting chemicals.

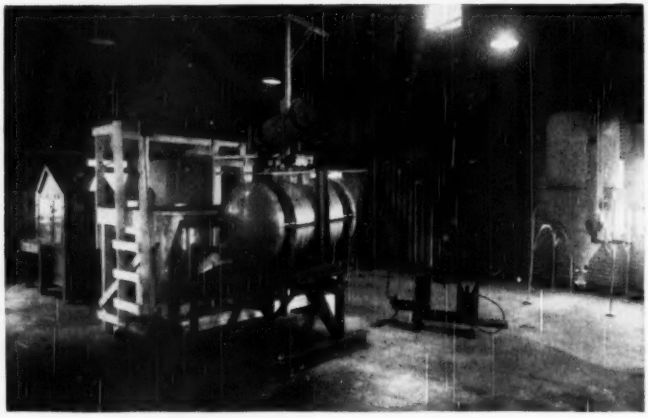
Details of the unnamed oil company's large-scale test are a well-kept secret, but a U. S. patent (No. 2,409,247) assigned to Socony-Vacuum Oil Co. is suggestive: It discloses the use of mono- and difluophosphoric acids as catalysts for the polymerization of olefinic hydrocarbons.

Two Threads

Development of the FP acids was a tying together of two threads, one originating in Oklahoma and the other in Germany.

The Ozark Chemical Co. was organized in Tulsa, Okla., in 1925 to produce heavy chemicals such as sulfuric acid, hydrochloric acid, potassium sulfate and salt cake. Some of the men behind Ozark, together with others engaged in processing zinc ores, founded the Mahoning Mining Co. in 1937 to drill and develop fluorspar deposits in the Illinois-Kentucky area. Its plants at Rosiclare, Ill. (opened in 1939), and Jamestown, Colo. (acquired in 1946), now produce about 40% of the acid-grade fluorspar consumed in the United States. Because of many mutual interests the two companies were merged into the Ozark-Mahoning Co. late in 1946.

In the meantime Dr. Willy Lange and his co-workers in Germany were donig research on fluophosphoric compounds, the results of which were published in the German journals during the period 1928-1933. His methods of preparation were purely academic and without commercial significance, but when he came to the U. S. in 1939 he was encouraged by C. O. Anderson, Ozark's vice-president in charge of research and development, to develop practical procedures for preparing FP compounds. His U. S. patents are assigned to Ozark-Mahoning or its pre-



FP PILOT PLANT:* Bright ideas may ripen.

* In the foreground, a 175-gallon aluminum reactor for making FP acids. To the right of this, a 1-gallon reactor for small lots of FP acids. At extreme right, spray drier for obtaining salts of low stability. At extreme left, dry-air compartment for handling hydroscopic materials.

decessor, Ozark Chemical. Merger of the mining company and the chemical company, bringing together the raw material and the chemical facilities, intensified the development program.

Tricky Materials

Synthesis of the FP acids (mono-, di-, and hexafluophosphoric) looks easy on paper: It simply involves mixing and reacting anhydrous hydrogen fluoride with phosphorus pentoxide. The headache comes from finding a material capable of containing them. Silver-lined equipment is used and cold brine is circulated through the jacketed reactor to remove the evolved heat. The anhydrous mono- and di-acids are produced simultaneously and separated by fractional distillation. The hexa- acid is obtained in solution (about 65% HPF_6) when water is present in the reaction mixture.

The acids show a considerable difference in ease of hydrolysis. The di-acid is the most active, resembling hydrofluoric acid in fuming and corrosiveness. The mono- acid is more stable but, paradoxically, it is harder to store since it attacks aluminum, magnesium, iron and glass. The hexa-acid is the most stable, and both it and the di- acid can be kept in aluminum or magnesium containers. Polyethylene bottles have proved satisfactory for sample shipments of all three acids.

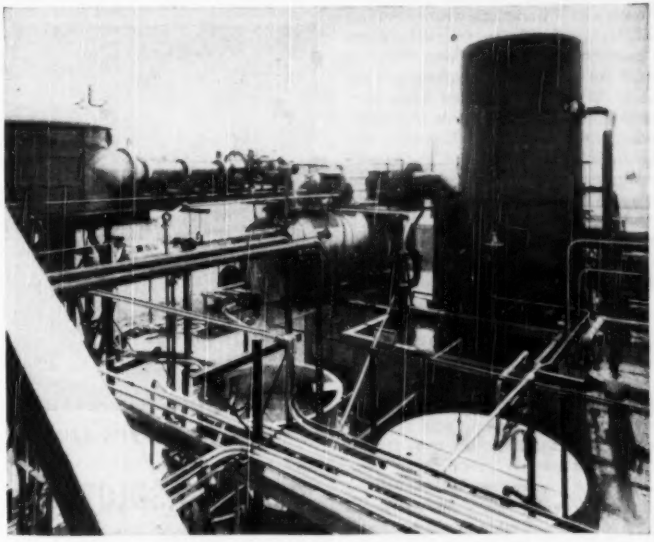
Their use as catalysts appears most promising, but other potential applications include metal cleaning, electrolytic or chemical polishing agents, and formation of protective coatings.

Salts Are Interesting

While most of the development work has been done with the acids themselves, their salts may also find commercial application. Most interesting is ammonium hexafluophosphate, which forms a double salt with ammonium fluoride that sublimes at 140° C. The salt in solid form or in solution doesn't attack glass, but the vapor is an excellent etching agent. There is thus a prospect for a glass-etching agent more conveniently handled than the conventionally-used hydrofluoric acid.

The water insolubility of quaternary ammonium hexafluophosphates may be exploited to make bactericidal and fungicidal agents more resistant to weathering; and several of the hexa- and mono- salts show promise for metal cleaning and soldering fluxes.

Many of these ideas are hardly beyond the "bright idea" stage, but Ozark-Mahoning hopes that lower production cost made possible by the enlarged capacity will hasten their ripening into profitable markets.



CHEMICO'S SULFURIC ACID: Subtraction, a drum absorber and a venturi collector.

CHEAPER SULFURIC IN PROSPECT

Simplified contact sulfuric acid plant design, made possible by drum absorber and venturi de-mister, promises lower-cost acid.

A NEW sulfuric plant design promises a less expensive product just as acid production is bumping the ceiling of plant capacity and installation of new acid capacity is being studied with more than ordinary interest (*CI, July 1950, p. 23*). Chemical Construction Corp. has just placed the first plant of this design into operation for its parent company, the American Cyanamid Co., at Hamilton, O.

This lower cost, both in initial capital required and in cost of production, is achieved by a series of subtractions plus a major improvement in the method utilized for sulfur trioxide absorption and the use of the Pease-Anthony venturi scrubber (*CI, May 1949, p. 742*) to remove the acid mist from the off gases before they are exhausted through the stack. The product is 95% or weaker sulfuric acid. Oleum can be produced but the cost of the required modifications is such that there is little if any saving over present designs.

Venturi De-Mister

Removal of acid mist from the exhaust gases has always been a major headache for sulfuric acid producers. Many devices such as Cottrell-type collectors have been used but heretofore the best method has been to reduce mist formation to a minimum by absorption of sulfur trioxide in concentrated sulfuric acid (usually 98.5% H_2SO_4).

The Pease-Anthony scrubber permits sulfur trioxide absorption in a relatively dilute acid solution despite the huge quantities of mist generated by the boiling liquid in the absorber. The heat for removal of water is supplied by the heat of hydration of sulfur trioxide and the sensible heat of the absorber inlet gases.

Drum Absorber

In the Pease-Anthony scrubber, a scrubbing liquid, dilute acid in this case, is introduced into the throat of a venturi tube. The high velocity of the gas passing through the tube atomizes the added acid solution and at the same time provides the intimate contact between the acid mist and liquid required for eventual coalescence of the fine particles. The resultant droplet are collected in a cyclone separator and recirculated to the absorber for recovery of the acid values.

Still another feature is the elimination of the towers for drying the inlet air with concentrated sulfuric acid, characteristic of present plant designs.

Chemico's new design replaces the

present packed vertical absorption tower with a horizontal drum absorber similar in design to the well-known Chemico drum concentrator which is used for concentrating dilute sulfuric acid. When used for the latter purpose hot combustion gases are introduced through a dip pipe below the surface of the acid contained in the concentrator. The sensible heat of the gases evaporates the water and dehydrates the acid. In past practice Cottrell precipitators were used to remove the resultant acid mist from the escaping gases.

An identical drum is used in the new plant design. However in this case the hot gases from the two-stage converter used for oxidizing sulfur dioxide to sulfur trioxide replace the hot combustion gases. Also the heat of absorbing sulfur trioxide in dilute acid provides much of the heat of vaporization needed for water removal.

Further, operation of the sulfur burner provides an exit gas with enough sulfur dioxide to allow quench cooling with cold air, eliminating the heat exchangers now used between stages in the standard two-stage converter. Use of quench air provides flexibility in operating temperatures, maximum utilization of catalyst, and highest possible conversion.

Lost in the Shuffle

Chemico engineers were not content with these major changes. A filter for molten sulfur has been substituted for the larger and more expensive gas filter normally installed for cleanup of the burner gas just before it enters the first catalyst chamber. Also, the plant has been so designed that gravity flow is used in the absorption system, eliminating circulating and transfer pumps.

The new design thus consists in series of a standard sulfur melter, molten sulfur filter, air blower, standard sulfur burner, standard waste heat boiler, a new type quench converter, revolutionary drum absorber from which the product acid is removed, product acid cooler, and a Pease-Anthony scrubber for the stack gas.

MORE CORTISONE—and at a lower price—is promised by a new production method described at the American Chemical Society's 118th national meeting in Chicago this month by Edward C. Kendall, co-discoverer of the drug, and four of his colleagues at the Mayo Clinic.

The new method permits synthesis from bile acids without use of osmium tetroxide, a scarce, expensive and toxic material.

AIR CLEANERS RUFF AND SUTER: From ducks to fumes.

POLLUTION SOLUTION

New economical method is highly effective for eliminating combustible vapors.

BETWEEN SHOTS on a duck hunting trip in 1945, Russ Suter and Dick Ruff got an idea. Their idea started a chain of developments that terminated in the establishment of the newly-formed Catalytic Combustion Corp.

As president of Michigan Oven Co., Ruff was plagued with the problem of fume disposal from its many industrial ovens for processing organic finishes. The nature of the effluent gases, mostly hydrocarbons, led them the choice of catalytic combustion as the most effective mode of treatment.

Catalytic Combustion the Key

Long a tool of the analytical chemist, catalytic combustion is not generally related to the problem of atmospheric decontamination. Use of platinum and other precious metals to catalyze combustion of burnable vapors at concentrations below the lower explosive limit is a well established laboratory procedure, but it took Messrs. Suter and Ruff to put this type of operation on a practical commercial basis.

Developmental work, begun almost immediately, led to the formulation of a cheap catalyst, rugged enough for industrial use yet possessing sufficient activity at relatively low temperatures for practical operation. Trial installations were made in 1949, leading to the organization of the Catalytic Combustion Corp. in February of this year. From its Wisconsin plant, the firm supplies catalytically-active elements for fume processing equipment makers.

The catalyst itself is composed of a mat of active material retained by a metal base consisting of two screens in a suitable framework. Excellent thermal conductivity and high temperature resistance characterize the metal base. Localized hot spots as well as unreactive zones are thus avoided and there is good transfer of heat from the exit side of the catalyst (where the temperature is highest), back toward the entering face (where it is most needed to initiate the reaction).

Heat Without Fire

In operation, the vapors are mixed with air and passed through the catalyst. An entry temperature of approximately 500° F. is required to ignite the fumes on the catalyst. Once catalytic combustion has been established, the process can be sustained with reduced air entry temperature. Oxidation occurs without flame on the surface of the catalyst and the heat generated by incineration is transmitted to the air stream, causing an abrupt rise in temperature. Sustained discharge temperatures above 1200° F. are permissible without damage to the catalyst.

Catalytic elements become deactivated after an extended period of duty. Life span depends on the nature of the fumes and operating temperatures. Experience with units already in operation has demonstrated that at least 4,000 hours of service may be expected before exhaustion. Upon deactivation, the element may be restored at reasonabel cost.

Use of the catalyst is limited to fumes substantially free of unburnable solids. While micron size particles

will pass through the element, fumes containing large quantities of cinders or abrasives cause clogging and failure in a short time. Poisoning which will result from the passage of metal vapors such as mercury and zinc imposes a further limitation.

Interesting Possibilities

In spite of its limitations, there remain many industrial processes where catalytic incineration has logical application. At present there are installations in a phthalic anhydride plant and in several wire enameling factories.

Even though actual field operating experience is limited to only a few industries, the potential applications of the catalytic method are numerous and diversified. Possibilities include paint, varnish, enamel and foundry core baking ovens, rendering of fish oils and animal fats, solvent evaporation processes, oil refineries, chemical plants, paper printing, asphalt processing and plastics manufacturing.

Catalytic combustion is currently most valuable for hydrocarbon treatment since the oxidation products, water vapor and carbon dioxide, are completely harmless and may be passed into the atmosphere in unlimited quantities. Cheaper than other solutions to combustible fume disposal, catalytic combustion promises to be a useful tool in air pollution control.

BACK TO NATURE

Preliminary bread standards issued by FDA forbids inclusion of many synthetic chemicals.

ATLAS Powder Co. saw $3 million's worth of annual sales hanging in precarious balance last month. Glyco Products, Inc., too, and the sales agents for both companies were ruefully reading the August 8 issue of the *Federal Register*, wherein was published the Food and Drug Administration's proposed ruling to prohibit the use of Span, Tween, and Myrj materials and similar products as emulsifiers in bread.

Of surpassing significance to the entire chemical industry, the ruling has caused chemical men to wrinkle their brows, looking for the reasons behind it.

Part of the answer is that the Food and Drug Administration was in a spot. It had been authorized by Congress over eleven years ago to establish standards for bread, and some farm-state Congressmen, notably Senator Gillette (Iowa) and Representative Keefe (Wis.) were getting worked up over reports that synthetic emulsifiers were replacing farm-grown lard and vegetable oils. Said Keefe: "I think it is a thing that calls for the intervention of and action on the part of Congress legislatively to deal with this problem."

Gillette was even blunter: "The Congress will not consent to having its hands tied, nor protection of the public delayed, by administrative agencies. Theoretically the administrative agencies are best suited to determine such things as to what ingredients are injurious or as to the nutrient required in food. But the Congress can act in these matters if it becomes necessary. And it may become necessary if the Federal Security Agency [under which the FDA operates — *Ed.*] prolongs their hearings, or fails in its duty to protect the public."

Gillette made his threat on August

J. R. FRORER: You can't wait a century.

23 of last year, and the bread standards hearings were adjourned September 20—less than a month later. The FDA's preliminary decision last month to ban the use of such emulsifiers in bread could hardly fail to please Messrs. Gillette and Keefe.

No Toxicity Proved

The FDA's proposed ruling gives three reasons for rejecting synthetic emulsifiers as an optional ingredient in bread: they deceive, they lower bread's nutritive value, and they have not been completely proved nontoxic.

As to the first point, the FDA says that "deception of some consumers as to the age of bread purchased has resulted from the use in it of polyoxyethylene monostearate." Atlas's comment on that: "This is particularly surprising in view of the fact that other emulsifier compositions sold for similar purposes . . . are included in the tentative standards." The reference here is to mono- and diglycerides, products of the large shortening manufacturers.

As to the second point, the glycerides demonstrably have a higher caloric value than the polyoxyethylene compounds. The contribution to nutrition of a substance used only to the extent of 0.5% of the weight of flour, however, is negligible to the point of nonexistence.

These reason are minor. FDA's major point is that "although there has been no definite evidence of injury . . . from their use . . . the record does not permit a conclusion that bread containing them is safe for continuous use over the human life span."

Research Endangered

The significance of the FDA's negative approach to the toxicity question is far-reaching for the whole chemical and pharmaceutical industry. Consistent application of that principle would soon put a stop to the development of new products, for almost a century would have to pass before they could be used in nutrition or medicine.

It is for this reason—believing that such a situation would not long be tolerated—that J. R. Frorer, general manager of Atlas's industrial chemicals department, is optimistic over the final outcome: "You can't stop technological advances."

Smoke Screen?

It's a pretty good guess that all the talk about toxicity—though no injury was proved—was a secondary consideration. The potent and well-organized edible oils lobby appealed strongly to farm interests. They even had an assist from the Department of Agriculture, whose Fats and Oils Director George L. Prichard said: "It is estimated that if these softeners came into widespread use in the baking industry, 600 to 700 million pounds of shortening, lard, butter, and oils would be eliminated from the baking industry's annual consumption of fat. This is equivalent to the production of soybeans from approximately 3,500,000 acres."

Two meat packers' spokesmen said, "Lard and vegetable shortenings are facing a serious threat from so-called chemical emulsifiers or bread softeners," and "When we bear in mind that the baking and cereal industries consume 1,350,000,000 pounds of lard and shortening annually, we see the ter-

Representative Keefe got in his licks: "These chemical manufacturers have developed and are developing products designed to supplant and replace nature's products, to inject into the food supply of the Nation inorganic (*sic*) materials as against the utilization of organic materials."

A crowning sentimental touch was provided on the last day of the hearings by the appearance of Mrs. Harvey Wiley, widow of the first FDA head, who expressed her objection to any type of synthetic materials in bread and reported that her husband ate only whole wheat bread made from home-ground wheat.

Battle Not Over

The standards are still tentative, and the FDA has extended until October 9, 1950, the time for filing exceptions to the proposed rulings.

Even if this particular ruling is withdrawn, however, the back-to-nature movement will still go on. Chemical manufacturers will next have to contend with a Congressional subcommittee set up to investigate the use of synthetics in foods and fertilizers, and many of them will have the feeling that this is where they came in.

CUT RATE KILOWATT

New radial engine offers hope of low-cost, self-contained electrical power generation.

ALL ELECTRICAL power consumers aren't lucky enough to be located in such areas as the Tennessee Valley or Niagara Falls. Those who don't have cheap power sources on tap have to weigh the cost of purchasing electricity—if available—against the cost of installing their own generators, and the latter are not cheap. A new primary source of power—the radial gas- or oil-burning engine of the Nordberg Manufacturing Co.—looks like a good bet to lower the cost barrier, make self-contained generators economically feasible for both small and large consumers.

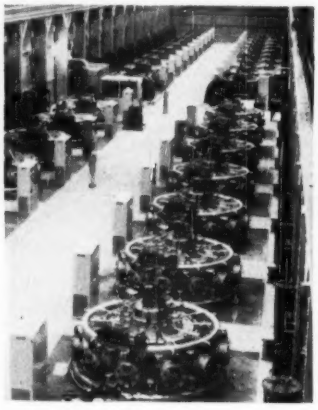
Such power units long have had to depend on the more costly steam turbine, or in-line diesel- or gas-powered generators. High initial cost of utility-used steam turbine generators puts them beyond the reach of any except the largest power consumers unless their process steam demands are tremendous in comparison with their electrical power requirements. The smaller user must look to in-line gas- or diesel-powered generators, and in some cases these provide an economical power supply.

Lower Investment

In view of the economy of the new Nordberg engine, these cases in which self-contained units are found feasible will become more numerous. Investment cost is lower—about 10% less than that for similar in-line gas-burning or diesel engines, and about 20% less than a comparable steam turbine plant. With its thermal efficiency of about 30%, the engine compares favorably with other types of gas-burning or diesel engines but is appreciably behind the highly efficient but high-cost steam turbine plants. Maintenance is estimated to cost less than that for conventional diesel power generation.

Power in a Package

At the first installation—Alcoa's Point Comfort (Texas) aluminum works—120 engines provide 2,750,000 KWH per day. Each engine—the largest that can be shipped in one piece was used to keep field erection costs down—has 11 cylinders, a 14" bore and 16" stroke, bolted radially to a cast frame. Each develops 1,600 HP at 360 rpm and is coupled to generators to supply 1,000 KW (DC) at 667 volts and 125 kva (AC) at 425 volts and 24 cycles.



NORDBERG AT ALCOA: The large pioneers for the small.

The economy of the new engine is underscored by Alcoa's choice of it as a primary power source. Its installation is so large that any type of power generating equipment could have been used. As Alcoa chose to use 120 of these engines rather than a steam turbine unit, it is easy to visualize a similar and perhaps relatively greater saving for the small installation electrical power consumer, who would require only one or two engines.

BROMINE ANOMALY

Unique brominating agent points way to new drug syntheses.

IF N-BROMOSUCCINIMIDE knows any organic chemistry, it will realize that its behavior is completely unorthodox. The simple truth is, it brominates where it shouldn't. This peculiar property has been seized upon by manufacturers of pharmaceuticals and biologicals as a valuable tool for developing such products as the cortical and sex hormones, antihistaminics and vitamin D_2.

At Low Temperatures

N-Bromosuccinimide (NBS) is a brominating agent which at low temperatures will substitute a bromine for a hydrogen atom located on a carbon adjacent to a double bond without destroying the double bond itself. Known to the organic chemist as early as the turn of the century, its commercial manufacture was not undertaken until the late '40s. Introduced by the National Aniline Division of the Allied Chemical and Dye Corp., and later produced by Arapahoe Chemicals, Inc., NBS allows the preparation of previously unavailable intermediates.

Easy control and convenience are characteristic of brominations with NBS. The unsaturated compound is gently refluxed with the reagent in an excess of carbon tetrachloride. Reaction proceeds with the formation of the brominated product and succinimide; no addition occurs at the double bond and no hydrogen bromide is formed. For example, the reaction products of NBS and 1-butene are 3-bromo-1-butene and succinimide.

Heavy Assets

NBS brominations do not take place in the presence of free amino, hydroxy or carboxyl groups, and complications arise when aldehydes are encountered. But NBS's assets include stability and low molecular weight. Ease of preparation (by cold alkaline bromination of succinimide) is another point in its favor. Brominations are accomplished with a minimum of secondary reactions and the succinimide formed is easily recovered from the reaction mixture.

The type of allylic substitution exemplified by the action of NBS is not new to the chemical industry. Shell Chemical Co. has a well-established high-temperature process for making allyl chloride on a large scale as an intermediate in glycerine and allyl alcohol manufacture. However, the mild conditions attending the use of NBS

now make it feasible to synthesize relatively unstable research-quantity chemicals which could not survive the harsh environment of the industrial process.

Helps With Hormones

NBS is currently getting its biggest play from manufacturers of biologicals and medicinals. A godsend to the sterol chemist, it has given him a powerful weapon in the struggle to develop efficient syntheses for such vital materials as the hormones and vitamins.

Synthesis of progesterone provides a concrete example. Degradation of sterol side chains has in the past been the chief obstacle to a practical working synthesis. Until NBS came upon the scene, the established means was a tedious, time-consuming method whereby the side chain was reduced one carbon at a time to the desired length. With NBS, the degraduation proceeds rapidly in three-carbon stages until the proper side chain is obtained. A yield of progesterone almost double that from the previous method is thus obtained without isolation of intermediates.

The above application provides an easy method for the degradation of steroid bile acid side chains to the "methyl ketone", "etio acid" and "17-ketone" stages, which in turn represent intermediates for the synthesis of the progestational, cortical and androgenic hormones.

Other noteworthy biochemicals synthesised with the aid of NBS are cortisone, penicillic acid, provitamin D_3, antihistaminics and γ-bromocrotonic esters—recently used in the synthesis of compounds related to vitamin A. The NBS synthesis of provitamin D_3 (the only D vitamin utilized by poultry), is now a commercial process with output surpassing even that of ergosterol (vitamin D_2). NBS has further been made use of in producing the all important cortisone. An enviable list of products for any compound.

Expensive Proposition

Although NBS is stable and easily made, its cost puts it beyond the scope of the mass production of low cost industrial products. Indeed, its use is limited to types of halogenation which are not accomplished by low-cost chlorine or higher-priced bromine. A steady expansion in the market for N-bromosuccinimide may be expected as chemists find new uses for its extraordinary type of substitution. For the present, its newly found position in the realm of organic synthesis has already been justified by its accomplishments.

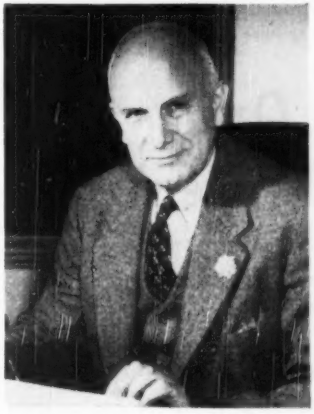
QUAKERS' GAMBLE

Pennsalt marks 100 years of chemical manufacturing.

ONE HUNDRED years ago this month, five young Philadelphia Quakers pooled their luck. They had a patent for a process to produce alkalies from salt, $100,000 in capital, a plant site spotted over salt deposits near Pittsburgh.

Early Trouble

But after five years of trial and struggle the process had to be chalked up as impractical.



GEORGE BEITZEL: An eye on tomorrow.

Operating expenses had gobbled up their capital, the venture appeared doomed. However, they didn't quake; instead they put up more of their own money, gave the business one more try. It was a good gamble: Today their company, the Pennsylvania Salt Manufacturing Co., is producing $38 million worth of products a year.

Solution in a Specialty

Scrapping the original process and converting to the conventional LeBlanc process was the course they picked. But some way to make a profit quickly, while the alkali enterprise was getting on its feet, had to be found. Founder Lewis supplied the answer: Put up lye in household-size packages for the then-extensive home-soapmaking trade. The new product was an instant success—so much so that in 1856 Pennsalt had its first profitable year. It has earned a profit every year since that time.

Eight years later Pennsalt acquired another new product, made an agreement with the Danish Government (a contract still in force) to import cryolite from Greenland. Cryolite soon surged into tonnage business. Hall's process for producing aluminum was a top consumer. Later cryolite acquired stature as a flux, insecticide, opacifier and source of alum.

In the '90's Pennsalt President Theodore Armstrong decided to go into salt electrolysis to make caustic soda, purchased land over salt beds at Wyandotte, Mich. Processing trouble again plagued the company. The original mercury cells had to be scrapped and the then-new diaphragm cell, invented by a young British engineer, Arthur E. Gibbs, was adopted. Simple and successful, it is still Pennsalt's principal caustic-chlorine producing method.

Many Roots

When Leonard T. Beale became Pennsalt's president in 1928 he charted a new course for the company, insisted that diversity of products was to be Pennsalt's strength. In rapid succession the company acquired General Laboratories, Inc., and its line of dairy sanitation specialties; Sterling Products Co. and its laundry and dry cleaning compounds. Pennsalt also entered the chlorate field, built a plant at Portland, Ore.

Research also came in for its share of attention. In 1944 Pennsalt purchased Whitemarsh, the Stotesbury mansion in Chestnut Hill, near Philadelphia, and converted it into a research and development laboratory. This, again, was part of Beale's plan of diversification—develop new products, investigate patents, processes—keep Pennsalt technologically in the fore.*

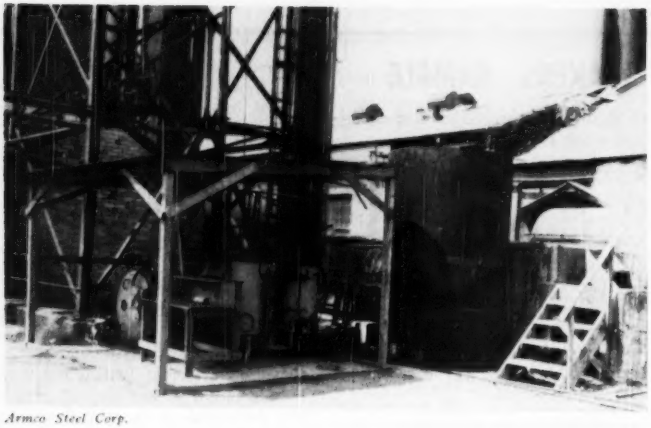
Sales-Minded Management

Last year, when Beale moved up to the newly-revived board chairmanship, George B. Beitzel, former vice-president in charge of sales, took over the presidential reins.

Under sales-conscious Beitzel, Pennsalt's sales volume is running at a level 262 per cent of those of ten years ago. Earnings for the first half of 1950 ($2,065,544) are the highest in Pennsalt's history.

Diversification, sales and research integration are paying off. With a $15 million plant expansion program just completed last year, Beale and Beitzel obviously are not as engrossed with the last 100 years' history as with the next century's challenge.

* Among Whitemarsh's notable accomplishments: development of an electrolytic cell for generation of elemental flurine.



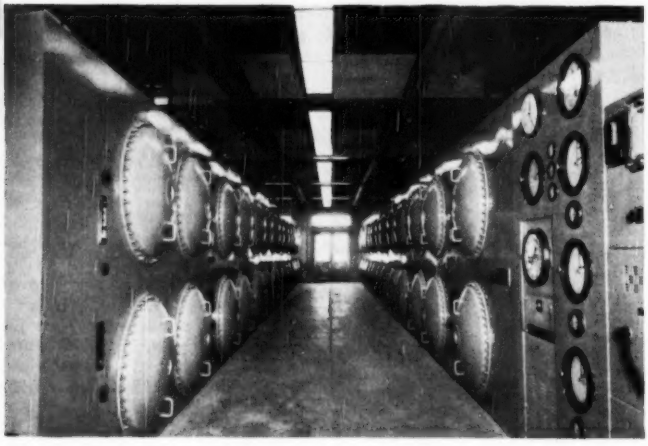
Armco Steel Corp.

PILOT PLANT for the study of destruction by ozone of phenols in coke-oven waste.

"Tonnage Ozone" for Chemical Processing

by VICTOR HANN, Director, Ozone Processes Division,
The Welsbach Corporation, Philadelphia, Pa.

PROCESSING ADVANCES HAVE LOWERED OZONE COST to the point where this extremely reactive form of oxygen can compete economically with currently-used oxidizing agents. Many heretofore "academic" reactions are potential profit-makers for those willing to consider this new processing tool.



IN "TONNAGE" SET-UPS ozonators are installed in multi-unit banks. The ozonators here are mounted behind decorative panels with only the end plates protruding.

ALTHOUGH more than 100 years have passed since the discovery of ozone, until 1946 it had achieved only limited commercial importance. Its earlier applications have been as a bactericide or fungicide rather than as an oxidant. Tremendous progress has been made since 1946 in the development of ozone as an oxidizing agent, and now it is highly competitive with many of the more common chemical oxidants.

It is easy enough to make small quantities of ozone. Almost any electric discharge through air or oxygen will produce some. But the engineering problem of making large quantities economically is an extremely difficult one, as many an investigator has found when he tried to increase the scale of his experiments by multiplication or expansion of his laboratory ozonizer.

It has been only recently that ozone equipment has been introduced which will continuously, dependably and efficiently produce "tonnage ozone." Cost data on large ozone plants are now available and evaluation of the economics of ozone as a general oxidizing agent is possible.

OZONE COST

For any problem of oxidation there is usually more than one oxidant which can be employed effectively. Assuming more than one oxidant will do the job, the actual selection will depend upon factors of cost, convenience, rate of reaction and, perhaps, certain unique properties of the individual oxidant. Thus hydrogen peroxide introduces to the reaction nothing but oxygen and water; ozone introduces nothing but oxygen.

While cost is not the only consideration, it is certainly an important one. A comparison of oxidants on the basis of their relative cost per unit of oxygen available in a chemical reaction is a good starting point in the evaluation of one oxidant against others. Obviously, there are other factors which must also be considered.

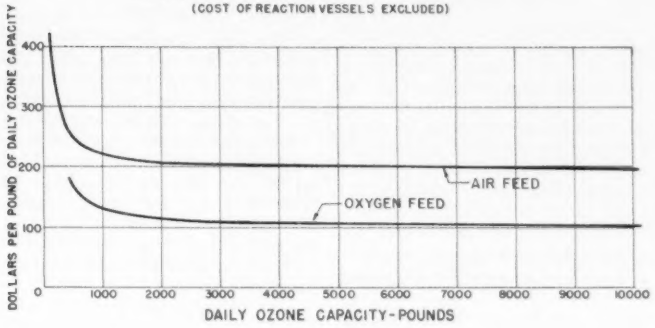
In Table I such a comparison has been made. Several common oxidants have been listed along with current published prices (carload quantities). No attempt has been made to add freight or handling charges. For the purposes of comparison, in the last two columns the cost of each chemical is stated in terms of the price at which one pound of ozone would be competitive in cost with that particular oxidant.

Two columns are necessary since either one-third (type 1) or all (type 2) of the oxygen in ozone can be utilized depending upon the individual

FIGURE 1

OZONE PLANT INVESTMENT COST vs PLANT CAPACITY

COSTS ARE BASED ON USE OF WELSBACH TYPE G STAINLESS STEEL OZONATORS. COST INCLUDES ALL NECESSARY AUXILIARIES, PIPING, CONTROLS, AND OUTDOOR INSTALLATION.
(COST OF REACTION VESSELS EXCLUDED)



chemical reaction. In most inorganic reactions, one-third of the oxygen takes part in the chemical reaction. In reactions with unsaturated organic compounds and in some inorganic reactions all of the oxygen may remain in the final products. In many cases the exact extent of the reaction is somewhere in between these two types.

Reference to Table I will show that in cases where the type 2 reaction occurs, ozone at a price of 54 cents per pound would be as cheap or cheaper than any oxidant listed with the exception of chlorine; ozone would have to sell for 11 to 14 cents to be competitive with chlorine.

With the type 1 reaction, ozone at a price of 18 cents a pound would be as cheap or cheaper than any oxidant except chlorine. Ozone would have to sell at 3.8 to 4.5 cents a pound to compete with chlorine.

In the following sections it will be shown that ozone can be produced for a total cost of 10 cents a pound or less under favorable conditions. Even under unfavorable conditions it can be produced for less than 50 cents a pound. Cost-wise, ozone in either type 1 or type 2 reaction is presumptively competitive with any of the oxidants listed with the exception of chlorine vs. ozone in a type 1 reaction.

COMMERCIAL OZONE

In the manufacture of ozone, air is cleaned by means of a combination electrostatic precipitator and paper filter. Compressed to about 10 psig, the air is then cooled to condense out most of the moisture and then thoroughly dried by passage over activated alumina, whereafter it passes to banks of ozonator tubes where it is subjected to a silent electrical discharge. Dry, clean oxygen can be used instead of air.

Commercially, ozone is produced as a gas diluted with a large amount of air or oxygen. Welsbach ozonators produce ozone from air at optimum efficiency at a concentration of one per cent by weight and from oxygen at a concentration of two per cent. Higher concentrations (up to 5 or 6 per cent with oxygen) are possible to obtain but only at substantial sacrifice in output and efficiency. When generated from air, ozone is accompanied by an impurity in the form of nitrogen pentoxide to the extent of one to two percent of the amount of ozone produced. This impurity can be removed by a water scrubber.

Welsbach ozonators produce approximately twice the output of ozone with an oxygen feed that they produce with air. Since energy consumption remains substantially the same, this means that the energy requirements per pound of ozone produced are reduced to one-half by the use of oxygen. Thus a generator which produces one pound of ozone from air will produce about 2 pounds from oxygen with an identical expenditure of electrical energy.

For this reason it is often expedient to use an oxygen feed in larger ozone plants where it is practical to recycle oxygen or where the ozone-stripped oxygen can be used in other processing.

Welsbach ozonators are designed for optimum operation at an air or oxygen feed pressure of 8 to 10 psig. They will operate at slightly reduced efficiency from atmospheric pressure to 15 psig. If higher pressures are required they can be obtained with a suitable booster.

While ozonized air or oxygen can be compressed and stored for limited periods of time, the fact that commercial ozone is accompanied by large volumes of diluent and is inherently unstable prevents its manufacture at a location remote from its point of ultimate use. From a practical standpoint, the user must set up to manufacture ozone for his purposes.

TABLE I—RELATIVE COST OF COMMON OXIDANTS VS. OZONE

Oxidant	*Price, ¢/lb.*	*Assumed Oxidizing Reaction*	*Equivalent Price for Ozone to Compete, ¢/lb. Type 1 Reaction (1 atom of oxygen enters reaction)*	*Type 2 Reaction (3 atoms of oxygen enter reaction)*
Chlorine (100%)	2.55–3.05	$Cl_2+H_2O=2HCl+O$	3.8–4.5	11–14
Nitric acid 36° Bé	5–6.5	$N^{+++++}=N^{+++}$	13–16	38–49
Bleaching powder (30% available Cl_2)	4.5	$2CaOCl+H_2O=CaCl_2+Ca(OH)_2+O$	22	67
Sodium bichromate (dihydrate)	9.75	$Cr^{++++++}=Cr^{+++}$	20	61
Potassium bichromate (100%)	13.25	$Cr^{++++++}=Cr^{+++}$	27	81
Potassium permanganate (100%)	21.75–22.75	$Mn^{+++++++}=Mn^{++}$	29–30	86–90
Sodium peroxide (95%)	18–18.5	$Na_2O_2=Na_2O+O$	31–32	92–95
Hydrogen peroxide (27.5%)	17.5–19.5	$H_2O_2=H_2O+O$	45–50	135–151
Potassium permanganate (100%)	21.75–22.75	$Mn^{+++++++}=Mn^{++++}$	48–50	143–150
Sodium chlorite (100%)	75	$NaClO_2=NaCl+2O$	71	212
Chlorine dioxide	*	$H_2O+2ClO_2=2HCl+5O$	57	172

* Based upon above prices for chlorine and sodium chlorite.

TABLE 2—AMORTIZATION OF OZONE INVESTMENT

Daily Plant Capacity, lbs.	*Amortization Cost, ¢/lb. of Ozone*							
	Five-Year Write-Off				*Ten-Year Write-Off*			
	360 24-hour days		*250 8-hour days*		*360 24-hour days*		*250 8-hour days*	
	Aluminum	*St. Steel*	*Aluminum*	*St. Steel*	*Aluminum*	*St. Steel*	*Aluminum*	*St. Steel*
500 (Air)	11.0	13.8	47.6	58.7	5.5	6.9	23.8	29.8
500 (O_2)	8.2	9.6	35.5	41.5	4.1	4.8	17.7	20.7
1000 (Air)	10.0	12.4	43.2	53.7	5.0	6.2	21.6	26.8
1000 (O_2)	6.0	7.4	25.9	32.0	3.0	3.7	13.0	16.0
2000 (Air)	9.2	11.6	39.8	50.2	4.6	5.8	19.9	25.1
2000 (O_2)	5.4	6.4	23.3	27.7	2.7	3.2	11.7	13.8
3000 (Air)	8.8	11.2	38.0	48.4	4.4	5.6	19.0	24.2
3000 (O_2)	5.2	6.3	22.5	27.2	2.6	3.2	11.2	13.8
5000 (Air)	8.7	11.1	37.6	48.0	4.4	5.6	19.0	24.2
5000 (O_2)	4.6	5.9	19.9	25.5	2.3	3.0	10.0	13.0
10,000 (Air)	8.5	11.0	36.7	47.6	4.2	5.5	18.2	23.8
10,000 (O_2)	4.5	5.8	19.5	25.1	2.3	2.9	10.0	12.5

Because of this fact, the fixing of the price of a pound of ozone is a complex and difficult matter. The final cost depends upon a variety of factors unusual in comparison to the rather simple summation of the purchase price, freight charges, storage and handling costs for an ordinary chemical.

The components to be considered in the computation of the cost of a pound of ozone are:

1. amortization of investment cost.
2. cost of electrical energy.
3. cost of utilities (steam and water).
4. cost of oxygen (if applicable).
5. operating labor and overhead.
6. maintenance.

INVESTMENT COST

In Figure 1 the relative cost of an ozone plant has been plotted against plant capacity. The curves are based upon the installed cost of Welsbach type G stainless steel ozonators. Installation includes piping, electrical wiring and controls, necessary auxiliary equipment (filters, blowers, coolers and driers) and assumes outdoor location of the ozonators.

From the curves in Figure 1 it can be seen that the relative cost of an ozone plant of the type described falls off rapidly with increasing capacity up to a daily output of 2000 to 3000 pounds, after which relative cost decreases very slowly with increasing capacity. With an ozone plant using an air feed the cost per pound of daily ozone capacity levels off at about $200; with an oxygen feed, at about $100.

By use of aluminum instead of stainless steel for ozonator construction, plant cost can be reduced by about 20 per cent. However, whereas the expected life of stainless steel ozonators might be placed at 20 years or more, the expected life with aluminum would be much shorter. With careful attention to operation of aluminum equipment and treatment of the cooling water to minimize water corrosion of the aluminum, a life expectancy of at least 5 to 10 years would be reasonable.

AMORTIZATION

Because it depends upon write-off policy and load factor, the cost component for amortization will vary widely. Table 2 is a tabulation of amortization costs per pound of ozone under various conditions.

ELECTRICAL ENERGY

The major operating cost for an ozone plant is for electrical energy. To generate one pound of ozone requires an over-all expenditure of about 9KWH with air feed and 4.5 KWH with oxygen feed. If the drier is reactivated by means of electricity rather than steam, these figures should be 10 KWH and 5 KWH, respectively.

STEAM AND WATER

For operation of the ozonators and drying equipment, cooling water is required. Steam (100#) is usually more economical than electricity for reactivation of the dehydrators. The cost of cooling water and steam for the dehydrators ranges from 0.5 to 1 cent per pound of ozone with air feed and about one-half that with oxygen.

OPERATING LABOR, MAINTENANCE

An ozone plant requires very little operating attention other than occasional check readings of meters and gages and reactivation of drying cells. This latter operation can be automatic but usually is only semi-automatic with manual resetting of valves and starting of the reactivation cycle after which the operation is carried on automatically. With the semi-automatic arrangement an operator is required for about 15 minutes every 8 hours.

OZONATOR with head removed. A few ozone-generating tubes have been withdrawn.

Maintenance of the ozonators requires cleaning of the ozone generating tubes once a year and normal attention to electrical gear and transformers. The auxiliary equipment, comprising air or oxygen filter, blower, cooler and drier requires maintenance normal for such equipment.

While long-term experience on operating and maintenance costs for large ozone plants is lacking, based upon experience with similar ozonators and auxiliary equipment in smaller plants indications are that the cost component for operating labor and maintenance expense will be one-half to one cent per pound of ozone or less for plants of 2000 pounds a day capacity and upwards. For smaller plants, where labor cannot be used as efficiently, this cost component will be somewhat higher.

OXYGEN

The cost of oxygen varies with locality, energy and labor rates. The amount of oxygen consumed depends also on whether one or three atoms of the ozone molecule are consumed in the chemical reaction. Again, depending upon size, locality, chemical reaction and the ease or difficulty of repurifying the oxygen to be recycled, the oxygen component of cost may vary from 1 to 3 cents per pound of ozone in large plants and 3 to 8 cents in smaller ones.

If low-cost tonnage oxygen is available, the oxygen component of cost will be only a few mills per pound of ozone. Furthermore, if oxygen can be used on a once-through basis with the ozone-stripped oxygen being sent on to some other process, important savings in capital and operating costs can be made by elimination of the drying and purifying equipment necessary in cases where oxygen must be recycled.

HOW MUCH PER POUND?

From the foregoing it can be seen that no simple answer is possible to the question, "How much does a pound of ozone cost?" Under favorable conditions ozone can be produced in quantity for 10 cents a pound or less; under unfavorable conditions (especially, poor load factor) the cost may be 50 cents a pound or more. Only a careful analysis of a specific situation can provide a reasonable answer. Such an analysis for four different sets of conditions is shown in Table 3.

PHYSICAL PROPERTIES

Ozone is an allotropic form of oxygen with the chemical formula O_3. Its molecular weight is 48.

Ozone has a characteristic odor readily detectable at concentrations well below those at which it is toxic. Prolonged breathing of ozone in concentrations greater than one part per million (by volume) should be avoided.

At ordinary temperatures ozone is a blue gas, but at the concentrations in which it is usually produced, the color is not noticeable unless the gas is viewed through a considerable depth. Ozone absorbs visible light strongly at 6000 Angstroms and ultraviolet light very strongly at 2537 Angstroms; these properties make possible the continuous measurement and control of ozone concentration with relatively simple photometric equipment.

Liquid ozone is a blue liquid which is highly explosive unless diluted with liquid oxygen or other diluents. Liquid oxygen and liquid ozone are not miscible in all proportions at atmospheric pressure, and in the two-phase range the ozone-rich phase is highly explosive. Concentrations of 30 per cent or less liquid ozone in liquid oxygen are stable but tend to become more concentrated by evaporation of the liquid oxygen.

In stating the concentration of ozone it is important to specify whether it is given by weight or by volume; these are quite different as a result of the higher molecular weight of ozone compared with those of nitrogen and oxygen. In commercial practice, ozone concentration is usually specified as weight per cent or as weight per unit of volume. In low concentrations such as are common in food preservation applications, the ozone is usually specified as parts per million by volume.

Table 4 presents a tabulation of selected physical constants for pure ozone.

CHEMICAL PROPERTIES

Ozone is a powerful oxidizing agent, exceeding all ordinary chemicals except fluorine in its oxidation potential. In the presence of water it reacts rapidly with many kinds of organic matter; it is a powerful and fast bleaching agent. It reacts with impurities in water, removing unpleasant tastes, odors and color as well as destroying bacteria and other organisms.

In the absence of water, ozone attacks most saturated organic compounds only very slowly at ordinary temperatures, but it reacts rapidly (even at —78° C. and lower) with unsaturated organic compounds, forming ozonides at double or triple carbon-carbon bonds. These ozonides may be hydrolyzed, reduced, or decomposed by heat to give such products as aldehydes, ketones, and carboxylic acids. In the case of ozonides formed at double carbon bonds (ethylenic linkages) the carbon chain is almost invariably broken when the ozonide is decomposed in any of the above-mentioned ways; thus the ozonation of oleic acid, an 18-carbon-atom acid having a double bond in the middle, leads to the formation of two nine-carbon-atom molecules. If ozonides of compounds having triple carbon-carbon bonds are carefully hydrolyzed or decomposed, one of the three carbon-carbon bonds is preserved in some cases.

At elevated temperatures, gaseous ozone reacts like molecular oxygen except that it is a more powerful oxidizing agent, and at low concentrations, ozone sometimes acts as a catalyst for the thermal reactions of gaseous oxygen. In certain cases, ozone also acts as a catalyst for reactions of oxygen with organic compounds dissolved in organic solvents or water.

Ozone undergoes some reactions (type 1) in which only one-third of its oxygen is used up, whereas in other instances (type 2) the whole molecule of ozone enters into the reaction and into the final weight of the products. Probably in many cases the exact extent of the reaction is somewhere in between these two types. It is probable that in bleaching reactions only one-third of the ozone molecule is chemically active, whereas in the formation of organic ozonides, the whole ozone molecule is used. When these ozonides are hydrolyzed (or otherwise worked up), either a part or all of the oxygen in the ozone stays with the final products, depending upon what products are formed.

Since ozone in large quantities and at low cost has only recently become available, it is desirable to outline possible large-scale commercial applications for ozone and to provide an indication of possible future developments.

TABLE 3—OZONE COST DATA

	Case 1	*Case 2*	*Case 3*	*Case 4*
Mode of annual operation	360 24-hr. days	360 24-hr. days	250 8-hr. days	250 8-hr. days
Write-off period	ten years	ten years	five years	five years
Ozonator construction	stainless st.	stainless st.	aluminum	aluminum
Chemical reaction	type 1	type 1 or 2	type 1	type 1 or 2
Daily (rated) capacity, pounds (24-hr. basis)	3000 (O_3)	3000 (air)	3000 (O_3)	3000 (air)
Ozone cost components, cents per pound				
Amortization	3.2	5.6	22.5	38.0
Electricity at @$.005/kw-hr	2.3	4.5	2.3	4.5
Steam and water	0.3	0.5	0.3	0.5
Oxygen	1.7	...	1.7	...
Operating labor and maintenance	0.7	0.7	0.7	0.7
Total	8.2	11.3	27.5	45.1
Total assuming electricity @$.01/kw-hr instead of $.005	10.5	15.8	29.8	49.6

Note: Type 1 reaction: one atom of ozone molecule enters reaction.
Type 2 reaction: three atoms of ozone molecule enter reaction.
Oxygen plant costs are based upon purification and recycling of oxygen or use on a one-through basis with ozone-stripped oxygen used in other processing. With type 2 reaction oxygen cost would be 3 times that shown.

TABLE 4—PHYSICAL CONSTANTS FOR PURE OZONE

Molecular Weight	48
Boiling Point	−111.5° C
Freezing Point	−250° C
Critical Temperature	−5° C
Critical Pressure	67 Atmospheres
Density (liquid)	1.71 g/ml @ −183° C 1.46 g/ml @ −111.5° C
Density (gas)	2.144 g/l
Heat Capacity, Cp, (gas)	8 cal./gm-mole @ −111.5° C 13 cal./gm-mole @ 700° C
Heat of Vaporization	2600 cal./gm-mole @ −111.5° C 3500 cal./gm-mole @ −183° C
Solubility (water)	490 cm^3/l @ 0° C

APPLICATIONS

There are many oxidation reactions where ozone might economically displace more expensive chemicals. In addition to cost considerations, ozone has advantages in ease of control and handling and freedom from residual salts and precipitates. It has the disadvantage of being in dilute concentration in a large volume of air or oxygen.

WATER PURIFICATION

Although ozone has been used for many years as a germicide in water treatment, only recently has its use in that field been pointed toward the removal of impurities by means of oxidation. In 1949 the Welsbach Corp. installed the world's largest ozone plant for removal of tastes, odors and manganese from Philadelphia water by oxidation. This plant has demonstrated the value of ozone for purification of one of the most notoriously bad water supplies in the United States.

OXIDATION OF PLANT WASTES

An interesting application of ozone now in the pilot-plant stage at Armco Steel Corp. is the destruction of phenols by oxidation in coke-oven waste. Phenols can be completely removed at what appears to be an economically justifiable cost. Ozone offers an easily-controlled means of treatment of this waste without the formation of toxic and objectionable reaction products.

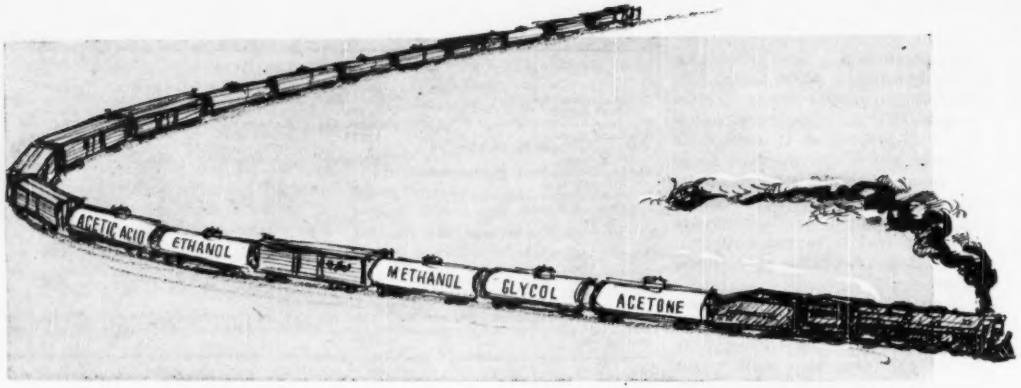
REMOVAL OF IRON

Walthall has described an interesting oxidation with ozone carried out in laboratory, small-scale and pilot plant-scale operations. Ozone was used to oxidize iron in an aluminum sulfate solution obtained in the process of extracting alumina from clay.

BLEACHING

Extensive laboratory- and small-scale tests on the use of ozone for bleaching of sulfate and sulfite pulps have been carried out. Indications are that ozone can be substituted for hypochlorite with advantage in the final stages of bleaching. The use of ozone produces somewhat higher brightnesses and a more "level" color. Until

(*Turn to page 515*)



Few new chemicals introduced in the past five years have attained tankcar stature, other than some higher priced specialties

How Sales Development Can Succeed*

SALES DEVELOPMENT NOW MUST SELL, not just offer, a new product, both to management and to the ultimate consumer.

EVERYONE is familiar with the chemical industry's growth during the past few years. Increases in capacity, record profits and spectacular new products, especially in the pharmaceutical and agricultural fields, have inspired editorial writers to muse on the "chemical age."

Over this expansion period, the chemical industry has learned more about itself. It has generally recognized that one of the essential functions of any chemical organization is to find new markets for old products, find markets for new products, and nurse new developments along until commercial markets materialize. These activities are variously described under the names sales development, market development, commercial chemical development, chemical market research and product development, and will be referred to here as sales development.

Fifteen years ago this department, if it existed at all, was generally the stepchild of the organization. But within the last ten years and especially the last five, almost every company has added a sales development group. A further commentary is the existence of the Chemical Market Research Association and the Commercial Chemical Development Association, both holding national meetings attended by as many as 500 people.

DEVELOPMENT FAILURE

Despite record chemical plant construction and profits and the fanfare accompanying the growth of the sales development function, the startling fact is that the latter—in one of the most important sections of the chemical industry—recently has been rather unsuccessful. The reader may be inclined to say immediately, "What is all the noise about? Look at all the new plants for glycol, phenol, alkyd resins, synthetic fibers, chlorine, sulfuric acid, etc."

Construction now in progress, however, consists almost universally of expansions either for basic chemical raw materials which have been available for years or for intermediates or finished products one or more steps removed from the basic chemicals—for new agricultural chemicals like lindane, toxaphene; for new pharmaceuticals like streptomycin and chlormycetin. Relatively little building has been for chemicals which are considered raw materials and have never been produced before. Sales development's chief function and hardest job is to establish markets for products previously unavailable commercially. It is here that failure has been conspicuous.

This discussion does not deal with the portion of the industry that purchases basic raw materials and compounds or blends them into finished products or intermediates. (A synthetic resin manufacturer can develop an alkyd modification in the laboratory and with very little or no capital investment introduce the product to the trade successfully in a few months.) Rather, this paper is concerned with the type of sales development that through research promotes a chemical new to the markets to the point where commercial production is considered. Actual construction will involve an expenditure of from several hundred thousand to several million dollars. Before management feels justified in furnishing capital, it must be presented with a clear picture of sales and profit possibilities.

Developments that have sold management during the last five years can be counted on the fingers of two hands. Even most of these are limited to such high priced specialties as Orlon, silicones, and polyethylene. The reasons for this startling lack of success may not generally be realized. It is important to try to shed some light on these.

EXPLANATIONS NOT VALID

There are several obvious explanations which have been mentioned many times but which probably are not particularly important in accounting for the limited number of such successful developments. The shortage of venture capital no doubt has held up or postponed indefinitely some expansions of new products or expansions of established raw materials such as chlorine, ethylene oxide, and urea, but the writer knows of no case

* The author of this article is director of sales development of a major chemical company. Because of the controversial nature of this material his company management would not permit use of either his or the company name.

a new chemical raw material has had to go begging for venture capital. This probably can be attributed to the fact that while capital for new sales development ventures may be high, it does not run as steep as that for major expansions of most companies' bread-and-butter chemicals. A company may be short of capital, but most managements are so anxious to diversify, they will be lenient in the case of an attractive new venture.

A similar reason until recently

"Now, because of high construction costs, an additional load is placed on the new product by a plant cost 2 or 3 times that of its older competitor."

has been the fear of recession and the feeling that it is best to postpone construction until raw materials, equipment and building costs were lower. Here again it is not felt that this has been an important factor in curtailing sales development progress.

It is true that the shortage of chemical raw materials and equipment may hold up new developments where the new material depended on availability of a scarce raw material such as benzene. Similarly, if commercial production depends on specialized chemical equipment, delivery of which will take a year or two, development is discouraged.

The above objections can all be overcome by an energetic and intelligent development program. Where the project warrants, a good sales development group can make the project appear so attractive that management will go ahead despite these hindrances. There are, however, some not so obvious obstacles less ephemeral in character and more difficult to overcome.

NEW VERSUS OLD

One of the most discouraging experiences in sales development work is to try to launch a new product competitive with an old one produced in a prewar plant. Even under normal conditions management likes to amortize construction costs for new products over a shorter period than plant expansions for old products where the gamble is not so great. Furthermore, the scale of manufacture for the new product is invariably smaller than the older competitive product. These two factors—faster amortization and smaller-scale production—are normally a burden on the product. Now, because of high construction costs, an additional load is placed on the new product by a plant which cost 2 or 3 times that of its older competitor. While chemical raw material prices in general have risen, they have not risen enough to reflect the replacement values of capital equipment.

All chemical companies have new commercial products on which sales development was launched shortly before the war. Their costs are approximately twice the figure predicted in 1940 and 1941. Yet these products are competitive with materials produced in prewar facilities, and sales prices for the prewar products have not risen nearly as much as those for new ones. The developments have not attained the success anticipated and these chemicals do not command the sales volume they would at prices reflecting prewar construction costs.

When a sales development man tries to sell management on putting up capital for a "hot" project, it is nice to represent it as going into a new field and being, therefore, non-competitive. Practically, how-

". . . it is nice to represent it as a 'hot project' going into a new field and being, therefore, non-competitive. Practically, however, this just isn't true; almost every new product is competitive with something."

ever, this just isn't true; almost every new product is competitive with something. After the project has been started and doesn't sell, he has to handle a product suddenly

". . . . the inertia of prospective buyers is extreme and it is a long drawn out proposition to push, shove and otherwise cajole research people into dusting the cobwebs off a sample and completing its evaluation."

competitive and priced too high. Today it seems that all chemical raw material manufacturers have sales development projects in various stages of poor health because the projected price is just too high to excite customer interest. Countless sales development compounds have been greeted with initial enthusiasm that augured a promising future only to run on high price rocks in the last few years.

It is easy for sales development people to become frustrated by the long time required for evaluation of new products by prospective buyers. It is a fascinating experience to spend an hour or so with a research director and his staff dreaming up possible uses for some new chemical—probably the most fun any sales development man has. The frustrating part comes when he follows up the sample several weeks or several months later only to find it gathering dust on the shelf. Probably 90 per cent of samples submitted are never opened. Both the prospective buyer and the prospective seller may agree that the product really has a rather rosy future, but managements don't put up capital on the basis of such entertaining speculation by chemists. The buyer has to prove he can make it at an attractive price.

This period of development is commonly estimated at 7 years, but it varies widely. Even in normal times the inertia of prospective buyers is extreme and it is a long drawn out proposition to push, shove, and otherwise cajole research people into dusting the cobwebs off a sample and completing its evaluation. Sales development people are learning that today this inertia is much greater than normal.

The changed effect of the profit motive is one of the most important

factors in this increased inertia. Many companies have their regular line of bread-and-butter products completely sold and their profits are higher than ever before. Instead of pounding the table for better products, the sales manager now pounds for more of the same. Research directors reflect this situation. There is not the same pressure to undertake a thorough evaluation of a new product, involving the expenditure of perhaps $10-50,000, to improve a lubricating oil, paint, ink, or textile fiber.

TECHNOLOGICAL LABYRINTH

Another factor which may not be generally realized is the influence of technological progress on both the time and money required for thorough evaluation. For example, ten years ago there were only two synthetic rubbers on the market, Thiokol and neoprene. They had been on the market for such a short time that relatively little was known about the technique of using them. They fitted into applications where solvent resistance was the main requirement. While people may not have been wholly satisfied with their performance, they were accepted simply because nothing better was available. Today there are dozens of synthetic rubbers of much better quality. Comparing 1940 polymers to those of 1950 is like putting a 1950 Cadillac against a Model T. The prospective buyer is not only much fussier about what he will accept, but evaluation of new rubbers for the specialized services to which they are put is a very involved and protracted job. The greater output, moreover, makes it impossible for a company laboratory, no matter how large, to test every new offering.

Finally there is the obvious factor that chemical companies, being staffed by humans, are resistant to change. This is especially true where it involves hard work, oftentimes with little apparent incentive at the time to spur them on. Resistance to even small changes is bad enough, but now this is aggravated by the length of time and the amount of work involved in evaluating new products, curtailment of the profit motive, the number of new products being offered, and the high prices of new products.

To overcome the present difficulties confronting sales development, two attacks suggest themselves: (1) make the decision to initiate commercial production easy for management; (2) make the new product so attractive to research directors and chief chemists that their lethargy is overcome.

EASING MANAGEMENT'S CHOICE

To be successful, any active and enterprising research laboratory must deliver so many products ready for development that the sales development group is unable to push all to the limit at the same time. In choosing the ones for maximum attention, those requiring little capital to achieve a reasonable scale of production are the best bets. Management's decision is very easy if it can be demonstrated that for a very nominal expenditure the company can be put into a new venture with reasonable prospects of a good profit. This is especially true if, despite apparently puny initial production, prospects for future expansion are good. It is a good idea to start in this way no matter how small the scale. Once the product is on the market uses for it can be diversified to expand sales to the point where new plant construction for still larger-scale manufacture can be justified.

When small-scale manufacture is undertaken, however, all groups of the company must push. The laboratory can cooperate by doing as much technical service work and application research as possible. The sales department can help by making sure that every account in its territory is continuously reminded that the new product is commercially available. Management should help by keeping the sales price low to stimulate new applications.

"The greater output of prospective products makes it impossible for a company laboratory, no matter how large, to test every new offering."

PRICING POLICY

It is difficult to generalize on pricing policy. In setting a price for new production, however, the wise course probably is to forget about current production costs and look only at production costs for the scale successful sales development can make possible. Suppose a new raw material costs 19 cents a pound to produce on a scale of 100,000 pounds a year. It is estimated that successful sales development will uncover a market of 10 million pounds at 15 cents a pound and a production cost of 10 cents with a possible market several times this at a slightly lower price. Conservative policy probably would dictate an initial scale at 25 or 30 cents a pound, which after several years would yield a conservative profit—still on a 100,000-pound scale. But suppose the product is priced immediately at 15 cents. The loss is $4,000 per year. So what? Isn't this relatively piddling compared to sales development and research expense? Also suppose the company reaches the 10-million-pound scale—the profit is $500,000 per year. Is it wise to sacrifice the possibility of a $500,000 profit for $4,000. Assume that either method of pricing results in successful sales development, and the 10-million-pound goal is reached. Immediate lowering of the price saves time and permits amortizing the expense in terms of lost profits. In other words, by not making the product on a 10-million-pound scale, we are losing $500,000 a year; therefore, all we have to do is save three or four days to make the price reduction pay for itself.

Another way of starting initial production is to interrupt production of a standard product and use existing equipment, as is, or with minor modifications. The screams of the manufacturing and sales department are especially painful if it interferes with the production of a commercial product when the plant is already running at capacity. However, it may well be a wise choice, since a small-scale start may lead to a major market.

BY-PRODUCT POSSIBILITIES

By-products hold possibilities for successful sales development. If the quantity is small, its disposal may be ignored. If not, it may be possible to start selling the by-product on a small scale, develop a larger market for it, and wind up making it either a co-product or the main product.

Maleic anhydride is an example ot this type of sales development product. Initially it was an unavoidable by-product in phthalic anhydride manufacture. Uses were found and sales soon outgrew the amount available as a by-product. Thus the former waste material was elevated

to the status of a profitable co-product. Finally, to meet still-increasing demand it was necessary to install plants for primary production from benzene and C_4 materials.

Such possibilities are easily and commonly overlooked. Company members all along the line like to concentrate on the more exotic products back in the research laboratory and often years away from commercial exploitation, rather than start a humdrum job on the "acres of diamonds" underfoot.

UNWISE DEVELOPMENT BETS

It is now very difficult to develop markets for chemicals where a large capital expenditure is required. A project based on several different synthesis steps (requiring much equipment) should be actively pushed only if it definitely appears that the product can be made on a large volume at a low price. As a general rule it is probably best to be suspicious of any chemical raw material which has to sell for much over 15 cents per pound on a large scale. A check of U. S. Tariff Commission figures on production of organic chemical raw materials will show few produced on a scale of over ten million pounds per year selling above that figure.

It is also wise to be wary of misusing precious sales development effort on chemicals which look as though they might have special uses at a high price, except where they fit into applications like pharmaceuticals, cosmetics and dyes. While competition is a factor in these, they have an average price level higher than materials used by the big consuming industries. Once production is started on a small scale to supply such outlets, perhaps cooperation by all groups in a company can find a larger market.

ELIMINATE EVALUATION INERTIA

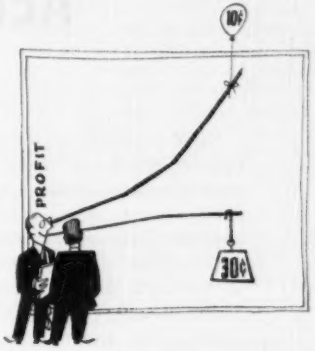
Just as sales development is presented with a choice of projects for maximum attention, so the research director of a prospective customer has a choice. The almost terrifying number of new products being introduced today makes his selection much wider than the development man's. There are so many attractive projects, it is an almost impossible task to pick ones for active development. The old system of throwing a new product on the market practically naked, with nothing but a price tag and a simple physical properties data sheet, doesn't work. A new product now must be fully clothed with data and suggestions for use. If sales development knows something about the industry it hopes to sell and has the laboratory facilities to develop a few typical formulations, nothing is more effective than presenting these along with a record of their performances.

A research director dislikes spending a great deal of time and effort on products produced on a laboratory scale only. It must be remembered that before he can be sure he has developed a salable product based on a new chemical, he in turn must submit his product to a prospective buyer and secure approval. Every research director has had the sad experience of offering a new product to a prospective buyer, receiving an order, and then learning that the raw material on which it was based was a laboratory sample. Almost the first question every research director asks is, "Can I obtain the product in commercial quantities and at what price?" Definite quotations as close to a large-scale production price as possible secure best responses.

Another method easily overlooked is simply to keep reminding the research director that a compound does exist. A sales development man may have a very pleasant conversation with a research director about a new product and leave feeling that the researcher's mind is full of ideas for using it. An hour after the sales development man leaves, an executive may call the director's attention to a complaint involving one of the company's standard products; another sales development man may give him fourteen new ideas; his wife may have a baby; or his house may burn down. He may not only forget his ideas, he is apt to forget the product itself. One of the most effective ways of reminding him that a material exists is advertising. Still another is to make sure the sales department has a knowledge of the development products and what is planned for them. Salesmen must continuously bring these products to the attention of everyone they meet. The sales development man himself must follow up his initial offering by telephone calls, letters, and personal visits.

SECRECY A BAR

The bane of very sales development man's existence is secrecy, even though research and patent people are infinitely more candid now than 10 or 15 years ago. Most research laboratories assume their job is completed when the laboratory work is finished and a big fat report is written. No chemical producer makes money on reports. He can't eat them and they don't even burn very well. Secrecy in sales development usually is the result of ignorance. The less someone knows about a problem the more secretive he is. Furthermore, just as the easy way out for an executive when confronted with a decision is to say either "no" or "let's wait awhile," so the easy way out for research and patent people is to be horror-stricken when asked to release information to outside companies. Unfortunately, people rarely get fired for saying "no," so it is easy to lose sight of the fact that companies don't make money from "no" decisions. It is the "yes" ones, the "let's go" and the "let's take a chance" decisions that bring in profits.



Conservative policy—profit even on pilot plant production and its attendant high price tag—may even sacrifice rapid production expansion and much larger, later profits.

PRODUCTION THE KEY

The most effective spur to rapid sales development success with any product is some commercial production. As long as it is in the laboratory or pilot plant, both the buyer's company and the seller's seem to dawdle painfully. But when there is some production—regular even though small—a product with some merit and a proper price tag should begin to spark. This initial poundage is the life-blood of sales development. Management can provide a blood bank in the form of miscellaneous flexible equipment not used for regular production. Then when a new product comes along it can be produced in small commercial quantities right away. This saves an enormous amount of talk and research expense.

A CI REPORT ON

AERIAL POLLUTION

Rapid expansion of the process industries plus a continually increasing population have combined to bring the question of atmospheric pollution to the forefront. Although technology has created the pollutant, the problems created are not solely those of technology.

For example, a factory originally located in the country may, with the passage of time, become surrounded by a residential area. The pollutant was formerly discharged into the air and diluted to a point of insignificance before reaching anything that could be damaged. Now it interferes with the normal livelihood of its neighbors. Who has the "right of way"?

To answer such a question, the rules must be examined and in the absence of rules arbitration provided—usually a suit in equity. In any event, the answer is obtained by due process of law. But technology must be called upon to provide the methods of control. In this discussion, the authors have chosen to break down the discussion into two parts, first, outlining what the law says must be controlled, and, second, the technological armament available for pollution control.

What the Law Says

by MELVIN NORD
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WARTIME and postwar expansion of industry has submerged cities like Los Angeles, whose principal product has hitherto been its climate, in a dismal "smog." Can Los Angeles tell industry to shut up its stacks or shut down? The answer cannot be found entirely in technology or in laws. It is the primary concern of neither. It is the public which is most vitally affected. But the public is the least articulate of the various groups and law and industry are struggling to gain the initiative.

The law enforcement officers feel that they represent the public and carry their "mandate" by "clamping down on offenders." Yet these officials are often poorly equipped to determine when to clamp down, how hard to clamp down, and in what way to clamp down. However, from their point of view a good record can be built up by stopping smoke and fumes from issuing from the factories even though the result may be more damaging than beneficial to the community.

Industry, however, has good reasons for non-interference—its efforts to achieve high production at a reasonable cost. The public will be best served if neither group gains the upper hand. Nor will it be best served in an evenly contested battle where each is armed with ignorance of the other's view.

The viewpoints of each of these groups, law, industry, and the public is exemplified by the following statements:

Law: County Counsel Harold W. Kennedy of Los Angeles County, California,[1] states, "It is for us to decide whether or not a city is greater because it has more industries and a larger population than some cities, or because it is a happier place to live in." He also adds, "Los Angeles seeks to retain and further enlarge its industry and yet also to restore the clean pure air it formerly enjoyed as a resort and tourist city.—It wants to have its cake and eat it too."

Industry: Mark E. Putnam of the Dow Chemical Co. observes, "I think most of us in industry would far rather meet our problems, whether they concern pollution or something else, voluntarily rather than by enforced regulation from the outside. . . . Formal regulation, if strictly enforced, is much inclined to work a hardship of one sort or another upon all to who it is applied."[3]

Public: The Chief of the United States Public Health Service speaks for the public, "It is inconceivable that the technicians who have developed American industry to its predominant position should confess defeat on such a relatively minor problem. Actually, wherever there is a desire to eliminate harmful results of wastes, technicians can find a way."[4]

There are meritorious points in each observation, yet there are wide differences of opinion. The lawyer says, "Clamp down!" The industrialist says, "I don't need your help. I can do it better alone. You don't

understand my problems." The public says, "I'm sick and tired of hearing excuses about how hard it is to stop pollution." Since much of the job involves both public and legal aspects of the problem, a major problem is one of education of each of the groups concerning problems of the other. This paper thus outlines the legal aspects of the aerial pollution problem for the technologist.

LAW OF NUISANCE

In atmospheric pollution cases the basis for liability is ordinarily the legal doctrine of nuisance. If statutes or ordinances are in effect they are based on nuisance on the broader doctrine of police power. What is meant by the term nuisance?

Although "there is perhaps no more impenetrable jungle in the entire law than that which surrounds the word 'nuisance,' "[5] the following is a close definition:[6] "The nuisance doctrine operates as a restriction upon the right of an owner of property to make such use of it as he pleases. . . . The term 'nuisance' is applied to that class of wrongs which arises from the unreasonable, unwarrantable, or unlawful use by a person of his own property and produces such material annoyance, inconvenience, discomfort, or hurt that the law will presume a consequent damage."

But what is "unreasonable"? What is reasonable to the factory owner may be unreasonable to the neighboring property owner. Who is to decide? This decision is up to the courts. However, court suits are not usually required to ascertain a course of action. A study of the "experimental data" available, statutes and ordinances, and past court decisions, will enable prediction of what the court will do in a specific case.

1. Must there be intent to harm, or must there be negligence?

In general legal liability for nuisance does not require negligence or intentional infliction.[7] The only test is whether a wrong was done. In atmospheric pollution cases willful conduct can practically always be shown. In many cases negligence is also present—in that proper care can usually stop pollution. In any event the liability is the same.

2. What's the difference between a "public nuisance" and a "private nuisance"?

The party responsible for a "publice nuisance" is liable to criminal indictment. If responsible for a "private nuisance" he can only be sued for damages or be put out of business. Every public nuisance is not necessarily a private nuisance. The remedy for the latter has been historically restricted to land owners.

Public nuisances are indictable as minor crimes. In addition the state may abate the nuisance or obtain an injunction prohibiting its maintenance, possibly putting the company out of business. In public nuisances no individual needs to be annoyed or injured. Only a tendency to annoy the public must be in existence

3. Is it an excuse if other people are doing the same thing?

There is no yes-or-no answer to this question. "The fact that other sources besides the nuisance created by the defendant may have contributed to the injury complained of does not relieve him of liability. But, while one nuisance doesn't excuse another, the fact that the neighborhood is devoted to offensive uses is to be taken into consideration in determining whether or not any wrong has been done."[8]

4. Must the acts be periodic or continuing?

An act must not be periodic or continuing to constitute a nuisance. But the remedy will differ if only a single act is complained of. Obviously a single act cannot be abated, nor will an injunction be granted prohibiting future performance of the same act. An injunction can be obtained against intermittent or periodic acts.[9]

5. Must the nuisance constitute a menace to health?

No, injuries to either persons or property are nuisances. Mere offenses to the senses can be nuisances. However, it is not a nuisance merely because it is unsightly or offends the aesthetic senses. There must be some physical or mental discomfort. Apprehension that something may happen is insufficient.[10]

6. How serious must the injury be to constitute a nuisance?

Both public and private nuisances require substantial interference with the complainant's interest. The law does not concern itself with trifles. The injury must be such that it would offend a normal person. Hypersensitive individuals may not complain of things which would not bother normal people. But just because some people are hardened to the discomfort does not prevent a normal person from bringing an action.

7. After a business was started in a rural area what happens if the business becomes surrounded by residential districts?

"The fact that a business was established in the open country remote from habitations will not defeat a proceeding for nuisance after the land in the vicinity has been built up and occupied; such business must give way to the right of the public and when buildings and habitations approach the place of its location, means must be devised to avoid the nuisance, or it must be removed or stopped."[11]

8. Will the value of the business to the community be taken into consideration?

This is the most important question in the law of nuisance as it affects business. The utility of the business will not in itself prevent the business from constituting a nuisance. However, the law does not impose liability in every case where the conduct of one is detrimental to another. Conduct becomes a nuisance only when it becomes unreasonable in the light of its utility and the harm which results.

This defense is of no value in private nuisance cases, since the benefit claimed is to the public and not specifically to the individual.[12] Even in public nuisance cases use of the doctrine is limited, as any substantial injury is usually considered unreasonable. The principal application is where an injunction is asked for. Many courts are reluctant to grant the injunction if the business is of importance to the public, but damages will occasionally be granted.

In brief, the utility of the business can affect the reasonableness of the use and take the act out of the nuisance class.

9. What remedies does the law provide against private nuisances?

There are three possibilities: an action at law for damages, an action in equity for an injunction, and self-help.

In many cases damages will compensate for injury. But this is not the case where the damages are irreparable, or there are repetitive injuries where the plaintiff is forced to sue again and again to recover damages as they occur. A court of equity will enjoin the defendant from maintaining this nuisance and he can be imprisoned for contempt of court.

The action in equity for an injunction differs from the law action for damages. Equity courts administer justice where strict application of law would produce an unjust result. Equitable relief is discretionary with the court and cannot be ordinarily had as a matter of right. Therefore, it is extremely difficult to predict whether equitable relief will be granted.

One who is guilty of misconduct cannot obtain relief in a court of equity. Nor will equity courts take jurisdiction where relief at law is adequate. Mere existence of a nuisance is not grounds for an injunction unless there is no adequate remedy at law.

An anomaly engrafted on this doctrine is that land is unique. A given piece of land cannot be replaced by another piece of land, nor by money. Therefore, for serious impairment in the use of land, damages are considered inadequate and an equity court will take jurisdiction. But an injunction is not automatic for every case of private nuisance. The injury can create liability at law for damages but not be irreparable.

Another limitation on use of injunction is the equitable defense of laches. In this defense continued failure of plaintiff to assert his rights has led defendant to assume that no injury is being committed.

Self-help is justified only when a possible irreparable injury is repeated and there is insufficient time to wait for legal process. The privilege is restricted to the use of reasonable force in a reasonable manner, and within a reasonable time after knowledge of the nuisance is acquired. One who uses such a remedy takes a chance. The honest belief that he is right will not prevent criminal prosecution or civil liability.[13]

10. What remedies are available for public nuisance?

Most jurisdictions have criminal statutes relating to the subject of public nuisance. Thus criminal action by the state is one remedy. In addition the state may bring a suit in equity to abate the nuisance or for damages. A private individual who is specially damaged by a public nuisance may also bring an action.

ATMOSPHERIC POLLUTION AS A NUISANCE

"The pollution of air so far as is reasonably necessary to the enjoyment of life and indispensable to the progress of society is not actionable. But the right of pollution must not be exercised in an unreasonable manner. . . . Thus, smoke, dust, noxious fumes and gases, or stenches or smells, may constitute a nuisance under some circumstances."[14]

Smoke and Soot: Smoke is not a nuisance per se. But smoke or soot may constitute a nuisance where it injures neighboring property or interferes with its use and enjoyment by persons of ordinary sensibilities. Where the injury caused by smoke is inconsequential or temporary, injunctive relief will be refused and the injured will be left to his remedy at law.[15]

Dust: Any dust which interferes with the comfortable enjoyment of adjacent premises constitutes a nuisance.

Fumes and Gases: A series of cases concerning the nuisance of fumes and gases will be detailed as an example of the multiplicity of legal and technical problems involved. The Ducktown Sulphur, Copper and Iron Co., and the Tennessee Copper Co. were the defendants.[16] In the first case in this long litigation each company was sued by private individuals for an injunction to restrain further operation of the plants. The complaint was that the defendant companies' plants released large volumes of smoke and fumes which injured trees and crops and made the complainants' homes less comfortable and their farm land less profitable although the lands were of little agricultural value. Each of the plaintiff's lands was assessed at about $80. It was claimed that unless the nuisance was stopped, the land would become unable to support the plaintiffs and they would have to leave.

The court found as a fact that the total tax aggregate of Polk County, where the plans were located, was $2,585,000 for the year 1903 of which $1,279,000 was assessed the defendants. Only 200 people lived in the district prior to the operation of these companies, but this had since increased to 12,000 people, almost wholly dependent on these plants. It was also found that the Tennessee Copper Co. had an average monthly payroll of $40,000 (1300 men). Further, Tennessee consumed approximately 3000 tons of coke, 2800 tons of coal, and 1000 cords of wood per month and about 80% of these supplies were purchased in Polk County.

The court held that there was a nuisance for which damages could be recovered, but refused to grant the injunction because of laches on the part of one of the plaintiffs. He had waited too long (ten years) before making any complaint. Concerning the other plaintiffs, the court said: "In order to protect by injunction several small tracts of land, aggregating in value less than $1000, we are asked to destroy other property worth nearly $2,000,000, and wreck two great mining and manufacturing enterprises, that are engaged in work of very great importance, not only to their owners, but to the state and the whole country as well, to depopulate a large town, and deprive thousands of working people of their homes and livelihood and scatter them broadcast. The result would be practically a confiscation of the property of the defendants for the benefit of the complainants."

Obviously the Tennessee court followed the "comparative injury" doctrine, that is, despite the unique character of land, the interest of the public would not be served by strict interpretation of the law. Later, both companies were sued for an injunction by the State of Georgia which based its claim on public nuisance; the case reached the United States Supreme Court four times.[17] The State of Georgia alleged that noxious gases from defendants' works caused a wholesale destruction of forests, orchards and crops, and other injuries were done and threatened in five counties of the State. Both companies were located in East Tennessee near the Georgia boundary line.

In the first of these cases (1906), it was held that an injunction would lie, but that it would be postponed to allow time for the defendants to complete the efforts they were making to stop the fumes. Justice Holmes said: "It is a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted on a great scale by sulphurous acid gas, that the forests on its mountains, be they better or worse . . . should not be further destroyed or threatened, . . . that the crops and orchards . . . should not be endangered. . . . Whether Georgia, by insisting upon this claim, is doing more harm than good to her own citizens, is for her to determine."

In 1914, the case was in the Supreme Court for a final decree. The facts as found by the court may be summarized: The ores used by these copper companies contained about 20% sulfur, and in smelting, great quantities of SO_2 are formed which in the air becomes sulfurous acid, which is destructive of plant life. Both companies installed purifying

TABLE 1. ANALYSIS OF THE COMPARATIVE INJURY DOCTRINE IN NUISANCE CASES

State	*Decision*	*Authority*	*Notes*
Alabama	For	Martin Bldg. Co. v. Imperial Laundry Co., 220 Ala. 90, 124 So. 82.	
Arizona	Against	Arizona Copper Co. v. Gillespie, 12 Ariz. 190, 100 Pac. 465.	1
Arkansas	Against	Meriwether Sand and Gravel Co. v. State ex rel. Attorney General, 181 Ark. 216, 26 S.W. (2d) 57.	
California	Against	Vorwinckel v. N. Clark and Sons, 216 Cal. 156, 13 Pac. (2d) 907.	
Colorado	Against	Krebs v. Hermann et al., 90 Colo. 61, 6 Pac. (2d) 907.	
Connecticut	For	Heppenstall Co. v. Berkshire Chemical Co., 130 Conn. 485, 35 Atl. (2d) 845.	2
Florida	For	City of Lakeland v. State ex rel. Harris, 143 Fla. 761, 197 So. 470.	
Georgia	Against	Holman v. Athens Empire Laundry Co., 149 Ga. 345, 100 S.E. 207.	
Idaho	Against	Hansen v. Independent School District No. 1, 61 Idaho 109, 98 Pac. (2d), 959.	3
Illinois	Against	Haack et al. v. Lindsay Light and Chemical Co., 393 Ill. 367, 66 N.E. (2d) 391.	4
Indiana	Against	Weston Paper Co. v. Pope, 155 Ind. 394, 57 N.E. 719.	
Iowa	Against	Bowman v. Humphrey, 124 Iowa 744, 100 N.W. 854.	
Louisiana	For	Monlezun v. Bunck Dry-Docks Co., 163 La. 399, 111 So. 886.	5
Maryland	Against	Huebschmann et ux. v. Grand Co., 166 Md. 615, 172 Atl. 227.	6
Massachusetts	Against	Cumberland Corp. v. Metropoulos, 241 Mass. 491, 135 N.E. 693.	
Michigan	For	Roy v. Chevrolet Motor Car Co., 262 Mich. 663, 247 N.W. 774.	
Minnseota	Against	Brede v. Minnesota Crushed Stone Co., 143 Minn. 374, 173 N.W. 805	
Mississippi	For	Reber v. Ill. Cent. Ry. Co., 161 Miss 885, 138 So. 574.	7
Missouri	For	Johnson v. Independent School District No. 1, 239 Mo. A.749, 199 S.W. (2d) 421.	8
Nebraska	Against	Kenesaw v. Chicago, B. and Q.R. Co., 91 Neb. 619, 136 N.W. 990.	9
New Jersey	Against	Sexton v. Public Service Coordinated Transport, 5 N.J. Sup. 555, 68 Atl. (2d) 648.	
New York	For	Bentley v. Empire Portland Cement Co., 48 Misc. 457, 96 N.Y.S. 831.	
Ohio	For	Antonik v. Chamberlain, 81 Ohio A. 465, 78 N.E. (2d) 752.	10
Oklahoma	Against	Kenyon v. Edmundson, 80 Okla. 3, 193 Pac. 739.	
Oregon	For	Stoddard v. Snodgrass 117 Or. 262, 241 Pac. 73.	11
Pennsylvania	For	Miller v. Zinn, 53 York 189.	12
South Carolina	Against	Williams v. Haile Gold Mining Co., 85 S.C. 1, 66 S.E. 116.	
Tennessee	For	Madison v. Ducktown Sulphur, Copper and Iron Co., 113 Tenn. 331, 83 S.W. 658.	
Texas	For	Hughes v. Jones, 94 S.W. (2d) 534.	13
Utah	Against	Kinsman v. Utah Gas and Coke Co., 53 Utah 10, 177 Pac. 418.	14
Vermont	Against	Bristol v. Palmer, 83 Vt. 54, 74 Atl. 332.	15
West Virginia	For	Board of Comm. of Ohio County v. Elm Grove Mining Co., 122 W.V. 442, 9 S.E. (2d) 813.	16

NOTES

1. Against, but injunction will permit defendant to change his methods of operation to stop the nuisance before the operation is entirely forbidden.
2. In favor of doctrine in a case involving the war effort, but not definitely decided in other cases.
3. Dictum in favor of the doctrine, but no definite holding for the doctrine. In the case cited, an injunction was granted, despite the dictum.
4. Court held in favor of the doctrine in a case involving the war effort. In a previous case—Off et al. v. Exposition Coaster, Inc., 336 Ill. 100, 167 N.E. 782, the court held against the doctrine.
5. The decision is not squarely in favor of the comparative injury doctrine, but seems to imply acceptance of it.
6. Against, except where the question is affected by a public interest.
7. Court held for the doctrine, but the case is inconclusive, since it involved a lone residence in an industrial area. In a later case—Williams v. Montgomery, 186 So. 302, an injunction was granted where the defendant came into a residential area.
8. For, where the public interest is involved. In a previous case—State ex rel. Hopkins v. Excelsior Powder Mfg. Co., 259 Mo. 254, 169 S.W. 267, court held against the doctrine where no public interest was involved.
9. Against, but not a particularly strong factual situation.
10. The case is not squarely in point, but seems to imply acceptance of the doctrine.
11. For, but other factors were involved.
12. The viewpoint in this state has changed from for to against and now seems to back to acceptance of the doctrine again.
13. For. Previous cases held against, but later cases have inclined towards acceptance of the doctrine.
14. Against, but will consider comparative injuries along with other facts.
15. Dictum in favor of the doctrine, but injunction was actually granted in the case cited.
16. In favor of the doctrine, but should be used with "great caution."

devices, and the Tennessee Co. and the State of Georgia entered into a stipulation whereby the company undertook to supply an annual fund to compensate those injured by the fumes, to conduct its plant subject to inspection in specified ways, and between April 10 and October 1 not to operate more green ore furnaces than necessary to permit operation of its sulphuric acid plant at full capacity. The State agreed to refrain from asking for an injunction before 1916 if the stipulation was fully observed.

The Ducktown Co. and the State were unable to agree and in 1914 the latter moved for a decree according a perpetual injunction. The Ducktown Co. had spent large sums of money—more than $600,000 since the first hearing in 1906—in constructing purifying works; approximately halving the percentage of sulfur content of the ores escaping into the air as sulfur dioxide. The court granted a temporary injunction restraining Ducktown from operating its plant unless: (1) It kept daily records showing fully and in detail the course and result of the operations. (2) A competent inspector, appointed by the court, had access to books and records of the company. (3) Not over 45% of the sulfur in the ore was permitted to escape, not above 20 tons per day between April 10 and October 1 nor above 45 tons per day at any other time. This injunction was carried forward with little modification in the next two hearings, and the case was retained on the docket "for such further action as may be proper, with leave to either party to apply for further relief."

The difference between the United States Supreme Court decisions and the Tennessee Court decision on the same nuisance illustrates the conflict between courts of different jurisdiction as to whether or not the "comparative injury" doctrine will be applied.

COMPARATIVE INJURY DOCTRINE

Perhaps the most crucial question concerning the legal aspects of atmospheric pollution relates to the severity of the penalty to be imposed upon a defendant who has committed a nuisance. The most drastic action possible is imposition of a permanent injunction. In some cases this is the death warrant for the business involved, since it may be virtually impossible to stop the offense without halting operations.

Injunctions can be obtained only in courts of equity where the harshness of the law supposedly is mitigated in the interests of fairness and justice. Hence, the question often arises as to whether the injunction would be more harmful than the condition to be enjoined.

One viewpoint is that where an injunction will cause serious injury to the owner of a lawful business or the community at large and a relatively small benefit to the complainant, the injunction should be denied, and the complaint remedied by monetary compensation. On the other hand, there is the more technical viewpoint: "If the existence of a private right and the violation of it are clear, it is no defense to show that a party has been to great expense in preparing to violate the right."[18]

Where the defendant seeks to recompense the plaintiff monetarily for his damages, this viewpoint seems very harsh indeed. The difficulty, however, is that land is regarded at law as being so unique that serious impairment of its use and enjoyment is regarded as incompensable in money.

From the point of view of justice, fairness, and common sense it would appear that there are certainly some cases in which the comparative injury doctrine should be applied. It is surprising that this viewpoint is completely rejected in the majority of states, and that it is generally applied with "great caution" in the states which recognize it. The courts have had great difficulty with this problem. It is hard to find any sound legal basis for reaching the common-sense conclusion. In a few states the court has clearly enunciated and applied the doctrine of comparative injury, basing its action on the "discretion" which a chancellor in equity has to see that justice and fairness are obtained. In other states the courts have sought ways of obtaining the desired result, while

(*Turn to page 506*)

How It Is Controlled

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CONTROL of atmospheric pollution is complicated by the varied types and amounts of contaminants present in emissions from industrial plants. Further, the environment of each plant may call for a different degree of control. Methods and devices are now available which make any degree of control technically possible. Therefore, pollution control is dominated primarily by economic considerations.

CONTAMINANT DISPERSION

Stacks: From the standpoint of economy, first consideration should be given to stacks. In many cases tall stacks have been found to be very effective in controlling atmospheric pollution. The tallest stacks in current use are about 600 feet tall, but it is believed that in the future, stacks as high as 1000 feet will be found practical in some instances.[1]

There are a number of limitations on the effective use of tall stacks. First, while they may effectively reduce ground concentration, they have no effect on vertical concentration which screens sunlight and which effects the precipitation of pollutants by rainfall. A number of stacks in the same vicinity lessen the advantage of dispersion over a large area since superimposition by the different smoke streams creates the same net effect as short stacks.

Particle size and density are important. Either or both of these may have such large values that gravity will prevent wide dispersion. The exit temperature of the gas is also of importance, since hot gases tend to rise further after they leave the stack. It has been estimated that a difference of 1° F. between exit gas temperature and atmospheric temperature is equivalent to about 2.5 feet of added stack height.

Some work has been done on methods for making quantitative predictions of the extent of pollution caused by stack emissions. The Bosanquet-Pearson equation and the Sutton equation are probably the most outstanding.[2] They indicate that ground concentration is directly proportional to mass rate of contaminant emission, indicating the possibility of diluting stack gases to control pollution, since dilution would not change the mass rate. Another important conclusion is that maximum ground concentration is inversely proportional to the square of stack height.

Meteorological considerations are also of extreme importance. A stack may prove to be unsuccessful under conditions of temperature inversion, that is where the earth is colder than the atmosphere. Gases rise naturally when the earth is warmer than the atmosphere but a "ceiling" forms and holds gases near the ground if the earth is colder.

Anaconda offers an interesting example of stack failure due to meteorological conditions.[3] It had been complained that cattle were suffering severely from arsenic poisoning caused by stack gases from the smelting plants. When four 200 foot stacks failed to stop this, a new stack was built 300 feet tall, located 700 feet above the roasting furnace on a spur of the Rocky Mountains. A 6,000,000 cu. ft. settling chamber was included in the system. This system also failed. Arsenic was plainly detected in air 35 miles from the plant. The surprising failure of this tall stack arrangement was due to cold air from the mountains to the south sweeping the stack gases back into the vicinty of the plant.

CONTAMINANT COLLECTION

When stacks are found inadequate, a collection system for the contaminants must be used. Selection of such methods will depend upon the type of contaminants in the stack gases and upon the degree of removal required. The latter factor is generally dictated by the environment of the plant.

Cyclones: The cyclone or centrifugal separator is the most widely used of all dust collection systems. Its simplicity and high effectiveness are its main advantages. The simple cyclone separator consists of a cylindrical shell mounted on an inverted cone so arranged that dust-containing gases enter tangentially at the top, forming a vortex which descends into the cone. Dust is precipitated by radial acceleration on the walls of the cylinder and cone, and is carried to an exit duct in the bottom of the cone by the downward travel of this vortex. An inner vortex formed by the gases at the bottom of the cone travels upward through the center to an exit pipe concentric with the outer cylinder.

Considerable research has been done to find methods for calculating pressure drops in cyclones. In 1930, Lissman derived an equation which states that the pressure drop equals four times the inlet velocity head and is independent of the size or shape of the cyclone.[4] His derivation was based on the assumption that the radius of the inner vortex equals half that of the outer and that friction was negligible. The first assumption has been found to be quite accurate; however the second is far from correct. Pressure drops as high as 20 inlet velocity heads have been encountered, and cyclones of different geometeric proportions may afford very different friction losses. However, as would be expected from Lissman's derivation, geometrically similar cyclones of different sizes have the same pressure drops as expressed in inlet velocity heads.[5]

It can be shown mathematically that the overall effectiveness of a cyclone is inversely proportional to the cyclone radius. Since draft loss is the same for similar cyclones operating at the same inlet velocity and since cyclone effectiveness varies inversely as cyclone radius, it is obviously advantageous to use cyclones of low radius. For this reason there has been an increasing use of parallel arrangements of low radius cyclones.

The collection efficiency of cyclone separators varies considerably with particle size. In a sense, a cyclone acts like a classifier, so that particles below a certain minimum size will be entrained by the air and carried out of the equipment. The most useful range of operation of cyclones extends down to 5 microns. Smaller particles may be collected where they tend to agglomerate in the cyclone to form larger particles.

Gravity Settling Chambers: When particle size exceeds 325 mesh (43 microns), gravity settling chambers are generally most practical.[6] Compared with cyclones, settling chambers have the advantages of greater simplicity, lower draft loss, and less abrasive wear. Their great disadvantage is that when the particle size is small, a chamber of impractically great size is needed. To protect cyclones from abrasion due to large particles, settling chambers are sometimes used to preclean gases before they are passed through the cyclone.

Settling chambers are usually built

as long, horizontal, rectangular chambers with inlets and outlets at the two extreme ends. It can be shown that for a given volumetric flow rate, the effectiveness of the settler depends upon the width and is independent of height. Of course the height must be great enough so that reentrainment is avoided. Generally, the gas velocity should not exceed 10 ft./sec.

To reduce turbulence and eddy currents, obstacles such as rods or screens are sometimes suspended in the chambers.[5] These devices may increase separation through impingement. Rappers may also be included to remove precipitated solids. For maximum effectiveness the gases should be well distributed laterally on entering the chamber. Such devices as gradual inlet transitions, distribution screens, and guide vanes are employed for this purpose.

The study of particle size and settling rates has contributed greatly to the effective use of gravity settling chambers. In the past, expensive failures occurred for lack of this knowledge. As previously noted earlier a six million cubic foot chamber together with a tall stack installed at Anaconda failed to alleviate the arsenic oxide pollution problem. It was not understood at the time that when As_2O_3 passes from the vapor to the solid phase at 190° C. the particles formed are too small to settle even in such a large chamber.

Electrical Precipitators: The electrical precipitators are probably the most versatile of all dust or mist collectors. Their efficiencies for both small and large particles are higher than those of any other type of collector affording the same range of head loss. They can be used where gases are wet or dry. They have been successfully operated at temperatures up to 1200° F. and at pressure up to 10 atm.

In contrast to systems which depend upon gravity or inertia, the efficiency of electrical precipitators is practically independent of particle density. Thus they are especially valuable in collecting substances of low particle density. Another distinguishing feature of the electrical method is that efficiency decreases as particle size decreases down to 0.1 micron but increases for particles smaller than 0.1 micron.[5] The disadvantages of electrical precipitators are high initial cost, fairly high power requirement, and in some cases high maintenance cost. Also, they are not used where the gases contain considerable amounts of combustible matter.

The initial cost of electrical precipitators is high in comparison with other systems, because of their greater complexity. In addition to the elements which act directly in precipitation, they require a unit to transform standard AC to voltages in the range of 50,000 to 100,000 volts and then rectifying it.

In all electrical precipitation, dust or mist particles are charged by gas ions which in turn are charged through corona discharge occurring in a non-uniform field. The charged particles are then precipitated on a collecting electrode.

Electrical precipitators may be either of two general types: single-stage or two-stage. In the two-stage system, particles are charged by one set of electrodes in a charging unit, then precipitated by an independent set of electrodes in a collecting unit.

Single-stage precipitators are generally used in removing dust or mist from industrial process gases while the two-stage systems have been applied mainly in air conditioning. One advantage of the two-stage system is that since the electrodes of the second-stage are used only for collecting, they may be built as plates and arranged very close together, thus allowing small equipment size. This close spacing would be objectionable for the high dust concentrations of most industral process gases, but where low concentrations are involved as in air conditioning it is a definite advantage.

Air filters have been designed for both air conditioning and dust removal from industrial smoke and process gas.[6] These can be made for any degree of collection efficiency but, of course, high efficiency filtration entails the disadvantages of high head loss and sometimes periodic cleaning at impractically short intervals. A recent development is the asbestos-containing paper filter media developed for cleanup of gases issuing from plants processing radioactive materials.

Impingement Separators: Several types are in use.[5] In these, polluted gases are passed through a chamber containing one or more types of obstacles. The inertia of the dust particles causes some of them to impinge against these obstacles and fall from the gas stream. The main advantage of the simple impingement separator is its adaptability to the conventional types of ducts. Their main disadvantage is low efficiency, especially for small particles.

Mechanical centrifugal separators which operate similarly to cyclones except that rotation is induced by a rotating member, and a number of other inertia separators are also in use.[5]

Scrubbing, i.e., using a liquid to collect air pollutants, whether solid, liquid, or gaseous is widely practised. It is generally ineffective unless some sort of packing or baffle arrangement is provided. In addition to mechanisms which depend entirely on scrubbing, there is equipment which combine scrubbing with almost every other method of collection.

Sonic: The use of high frequency sound is the most recent development in the field of dust or mist collection. (CI, July 1950, p. 26). Sound waves are very effective in rapidly agglomerating fine particles. The effect is due to the vibratory motion imparted to suspended particles, which causes them to collide and agglomerate. After agglomeration particles are sufficiently large to permit collection in cyclones. This process is limited with respect to the particle density, as too low a particle density will make the necessary collisions impossible. There is, however, no lower limit to the size of particles which can be collected. The recent development of powerful sound generators indicates a wide use of this principle in the near future.[7] Though this is a new development, installations are already in use for collecting sulfuric acid mists and soda ash.[8]

Removal of destructive gases, particularly acid gases, is a special problem. These gases cannot simply be scrubbed from the process gas and then dumped into a convenient river or stream. This would simply transfer the pollution from the atmosphere to the water, where it might be equally destructive. A system has been designed for removing SO_2—one of the most common gaseous pollutants— as a precipitated salt and then recirculating the water effluent. Granulated activated charcoal has also been used to absorb pollutant gases. Generally the expense of removing destructive gases is not justified by the value of the product recovered. However, this may not be true in the cases of the more expensive gases such as bromine and hydrogen chloride.[1]

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RESEARCH CATALYST:

The Specialized Technical Intelligence Unit

by R. D. SHEELINE
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SCIENTISTS DOING CLASSIFIED WORK for the Department of Defense were hopelessly snafued trying to locate material kept under security wraps. The result: a specialized technical intelligence unit, which has proved so valuable that military authorities have approved this description for industry to see if similar activities might be worthwhile.

WOULD you like to have a handful of publications in your office or laboratory which contain not only an abstract of every technical paper in your field of interest and a four-way cross-referenced index to the abstracts, but, in addition, by means of current loose-leaf abstracts, keep you abreast of all work going on in that field? Providing such service to the solid propellants field is the basic task of SPIA, the Solid Propellant Information Agency, operating at the Applied Physics Laboratory of Johns Hopkins University, Silver Spring, Md., under a Navy Bureau of Ordnance Contract with the financial support of all three military services.

BIRTH

In the spring of 1946 leading scientists in the solid propellant field gathered at an informal luncheon sponsored by the Navy's Bureau of Ordnance and the Army Ordnance Department. The war had ended the year before, most military production had ceased, considerable retrenchment had taken place, and the cooperation of these men was being sought to aid in the careful planning which would be essential to obtain the utmost from the nucleus of scientific personnel remaining. "Two important steps should be taken," advised these scientists. "First, an arrangement should be made whereby complete and rapid exchange of technical information could be accomplished in spite of military security restrictions. Second, as most wartime work on solid propellants was security-classified and therefore not well distributed, a technical 'intelligence' group should be set up which would collect at least one copy of all these reports, abstract them, and list them in a cross-referenced subject index."

Plans for the Solid Propellant Information Agency began to take form along the lines of these recommendations. Primarily it was to be a service organization which, figuratively speaking, would stand at the elbow of the solid-propellant scientist and supply him with reference information in such a form that he could use it with little effort.

GROWTH

The initial function of the agency was to seek and acquire as complete a file of literature in the solid propellant field as was possible, starting with early World War II work and including all available reports from foreign countries as well as the United States.

By mid 1949 most of the available abstracts of American reports had been published and the first subject index was issued. About that time the first set of loose-leaf "Current Abstracts" also appeared. These are issued approximately every two weeks and are written both to keep the reader informed of over-all progress in the field and to furnish the specialist with sufficient information so that he can readily determine which reports he should study carefully. One result of issuing the current abstracts has been a marked decrease in the number of copies of reports distributed to the special mailing list. The reports can now become "library copies" available on request to the scientist who selects them from the carefully prepared abstracts. In addition, the scientist now has many more hours for additional research—the hours he used to spend reading reports which he felt "might" have something of value to his work. Important too is the aid the current abstracts have been to those in administrative positions who are supposed to "know everything about everything" in the field.

In selecting the SPIA staff, the Applied Physics Laboratory wisely chose scientific personnel with chemistry, physics or engineering backgrounds. As a result, staff members have become experts in the solid propellant field and perform services above and beyond that originally expected of the group.

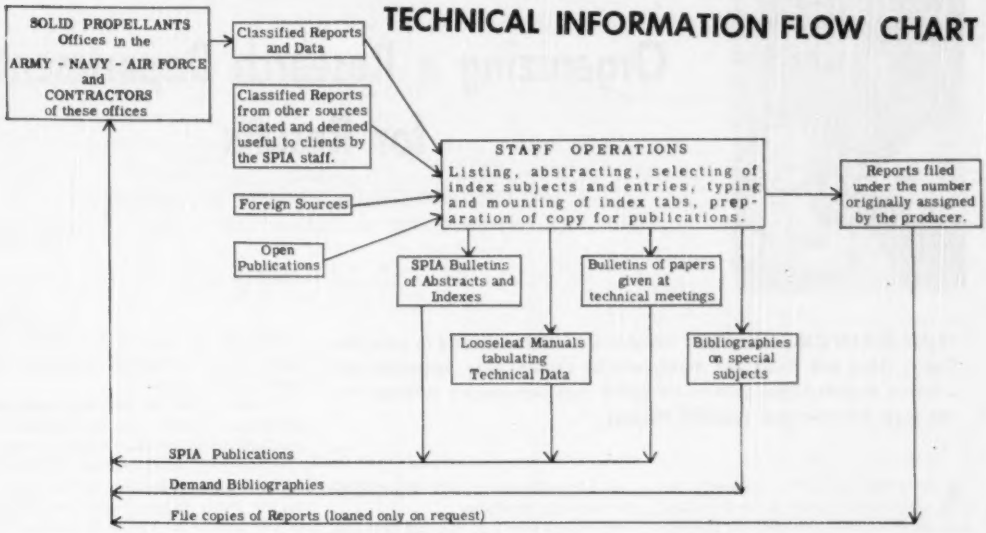
For example, in a recent propellant manufacturing operation tests of the final product began to go haywire. Just fifteen minutes after receiving a phone call, SPIA reported back a list of several publications covering wartime manufacturing experience which not only described the same difficulties and led to the solution of the problem but gave certain clues which, upon further investigation, resulted in the production of an improved propellant.

SERVICE PLUS

SPIA is also becoming proficient in preparing special bibliographies for organizations or individuals new to certain phases of the field, or for use in the evaluation of certain projects.

Since the first informal meeting in 1946, described above, Army, Navy and Air Force personnel in the solid propellant field attend annual meetings which are conducted much like any meeting of a technical society. The details of arranging these meetings, prepublishing the papers, and preparing a bulletin covering important discussion of the papers are handled by SPIA.

Another important service rendered by SPIA to its clients is the preparation of loose-leaf manuals containing tabulated technical data on special topics. The first of these describes in detail every model of solid propellant rocket that is used, or might be used, in assisting the launching of a larger rocket, a guided missile or an airplane. Manuals covering other special


TECHNICAL INFORMATION FLOW CHART
SOLID PROPELLANTS
Offices in the
ARMY - NAVY - AIR FORCE
and
CONTRACTORS
of these offices
Classified Reports and Data
Classified Reports from other sources located and deemed useful to clients by the SPIA staff.
Foreign Sources
Open Publications
STAFF OPERATIONS
Listing, abstracting, selecting of index subjects and entries, typing and mounting of index tabs, preparation of copy for publications.
Reports filed under the number originally assigned by the producer.
SPIA Bulletins of Abstracts and Indexes
Bulletins of papers given at technical meetings
Looseleaf Manuals tabulating Technical Data
Bibliographies on special subjects
SPIA Publications
Demand Bibliographies
File copies of Reports (loaned only on request)

aspects of solid propellant work are in preparation.

The exact extent to which SPIA has helped to promote progress in its field is unknown, but there is no doubt that it has returned its cost many fold. Indicative of the value placed upon SPIA's services is the comment of the director of one of the larger organizations in the field. He expressed the opinion that in the event of a reduction in funds for solid propellant work he would rather see his organization absorb the cost of operation of SPIA than to have SPIA reduce its effort.

Due in large part to the effort of SPIA, there is an excellent cooperative spirit existing in the field. Individuals from laboratories which are widely separated—both geographically and organizationally—make impromptu suggestions about each other's work or comment about their own experience in a similar effort. In several instances these scientists have recommended to the military authorities that symposia on certain subjects be arranged or that panels of experts—frequently including men outside the field—should be set up to assist in studying certain phases of the work.

While the actual cost of operating the Solid Propellant Information Agency is not available, it is estimated that a similar project could be set up for an industry at a cost ranging from $50 to $100 per year for each technical man, depending upon the size of the group served.

The raw material for SPIA's operation comes primarily from the report-producing activities of the participating groups. Other material is obtained from foreign reports and the open literature, while the information for the loose-leaf manuals is usually obtained on forms prepared by SPIA and filled out by the groups concerned.

As each report is received by SPIA an abstract is prepared, and each abstract is assigned a serial number. The abstract is preceded by the title of the abstracted document, name of author, date of publication, present security classification, a physical description, name or initials of issuing organization, and document number under which the material was issued. The abstracts are ultimately published in bound volumes with cumulative cross-referenced subject indexes.

The current abstracts are prepared to fit a loose-leaf binder. Each bi-weekly set of abstracts contains three sections: abstracts on work in progress; abstracts of reports on finished work (once a year these are removed from the loose-leaf binder and bound); and an index of reports abstracted in that set. Cumulative indexes are issued every three months at which time the previous bi-weekly and quarterly indexes are discarded. When the cumulative index grows too large for its economical continuation, it is prepared in final form as a bound subject index, and another cumulative index is started.

The index volume contains: (1) a list of abbreviations encountered in solid propellant research and development; (2) the coded technological arrangement of subjects used in indexing; (3) an alphabetical guide to the coded arrangement of subjects; (4) the complete subject index to the abstracts, organized on the basis of the code-numbered subjects; (5) an author index; (6) a report-number index listed under an alphabetical arrangement of report-issuing sources.

The first step in processing a document is the preparation of an accession-file card and the filling-in, by a secretary, of the upper half of a "work sheet." This work sheet has spaces for the information that will later become the preamble of the abstract. The document is then studied by one of the agency's scientists. He selects the SPIA-coded subjects under which the document should be indexed, writing their code numbers on the work sheet. He then adds the names of any chemical compound or other item on which the document gives some specific information. On the reverse side he writes the abstract.

The subject-index entries are prepared on ¼" x 8½" tabs. Each tab shows the assigned abstract number, the index title of the document, the author's name, and the month and year of publication of the document. The tabs are placed in their appropriate places in the master index, kept, for ease in expanding on the metal panels of a PBX board such as is used by telephone operators. By this means the master index is constantly kept up-to-date. The tabs located under a particular subject are arranged chronologically by date of publication of the related document. The bound subject

(*Turn to page 515*)

Organizing a Research Department for Results

by F. L. MATTHEWS, Research Director, Merrimac Division, Monsanto Chemical Company, Boston, Mass.

IF AN EXPANDING RESEARCH ORGANIZATION is allowed to grow like Topsy, chaos will result and money will be thrown away. Imposition of a logical organizational pattern will direct each researcher's abilities into the most effective and resultful channel.

AN INDUSTRIAL research organization is not a fixed immutable entity. A complex, fluid organism, it reflects the history of the country: the history of the company: the temper of the times in which it is placed; the opportunities available; and the attitudes and personalities of general company management, of specific local management, of its own management, and of its members.

Since change is the essence of research, the ability to accommodate to change in emphasis is the essence of the industrial research organization. Therefore, any description of such an organization is not a description of an abstract thing, but represents an individual's personal synthesis of the above elements conditioned by his own experience.

While the title stresses organization, the objectives of the laboratory come first: organization follows.

OBJECTIVES

The underlying objective of industrial research, as of all business, is to provide profits to the stockholders of the company. This is another way of saying that the underlying objective of industrial research is to increase the national income. Research results in new capital investment or better utilization of existing capital investment. Both mean new or better things and more or better-paid jobs.

The specific objectives of an industrial laboratory can be sub-divided in many different ways. One convenient way is to group them under four distinct, but not mutually exclusive, headings:

1. Development of new products.
2. Development and maintenance of economic processes.
3. Development of new applications for existing products.
4. Improvement of existing products.

The development of new products is in itself a broad term and covers several categories of new products:

1. Products new to the company.
2. Products new to industry.
3. Products new to science.

By tracing the manner in which each of the specific objectives is carried out, we provide the basis for establishing an integrated organization.

PRODUCT DEVELOPMENT

Products new to science are like an atomic bomb: very glamorous, and very infrequently developed. These rare products are usually unpredictable and result from the brilliance and ingenuity of an inventive individual, virtually independently of the form of the organization. Products new to science are, by virtue of their very newness, expensive in money and time in their development. The newness of the technology and the necessity for consumer education normally force a considerable expenditure of time between the inventive act and the final commercial development. Because of the expense and magnitude of the development of the program involved, such products new to science are almost necessarily handled outside the normal organization. They require their own organization once the initial exploration has been completed.

The discovery and development of such products requires an individual of the highest order of scientific ability. However, he need not be exclusively engaged in the search for such new products, since more frequently the basic idea for such new products arises in the course of other work and depends for its exploitation upon the ability of the individual making the discovery to recognize the value of what he has found.

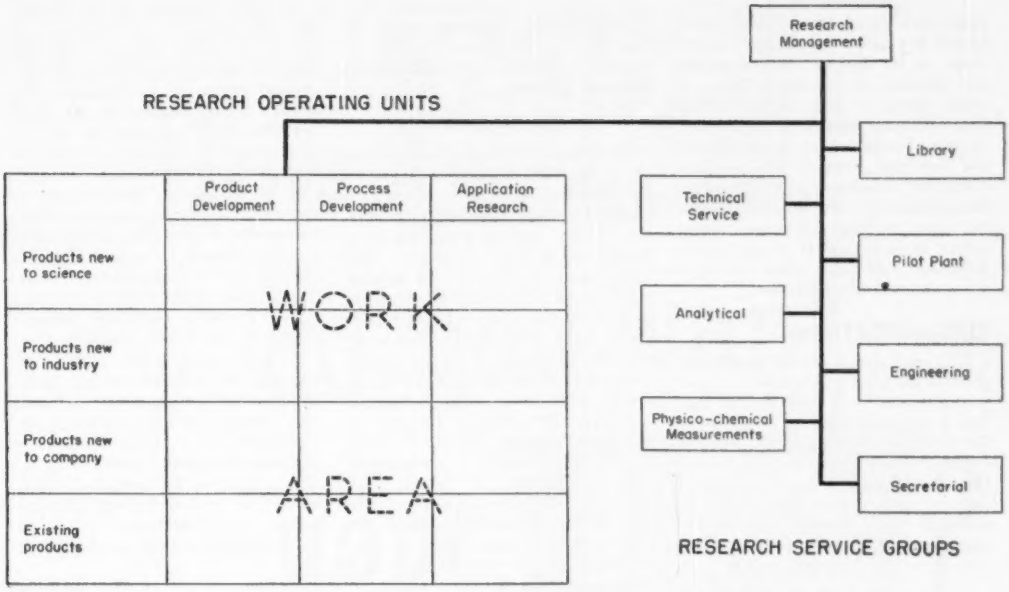
Products new to industry, such as aluminum, which was a laboratory curiosity until economic means of manufacture were developed and it became a commercial product, conform more to the usual organizational problems of an industrial research laboratory. These products are usually those which have been discovered in academic or in industrial research or those for which processes have been discovered in the course of such research, but which have remained laboratory curiosities because of lack of apparent utility, lack of chemical purity or lack of an economical means of manufacture.

To find such products, individuals are needed who are familiar with the basic, scientific and company literature, with the raw material and manufacturing position of the company, and with the fields of potential use.

In the development of such new-to-industry products a series of questions are usually asked of the research group: What compounds are known? What related compounds can be made which fit the company's manufacturing scheme? Which of these compounds is potentially economic or alternatively, or at the same time, what compounds are known or what related compounds can be made in fields of interest to the company and where the company has some knowledge? Which of these compounds is potentially economic?

The development of products new to the company, but not necessarily new to industry, is probably the most common problem encountered by the industrial research laboratory. These are the products which have already been introduced to the market or which are equivalent to materials already introduced to the market, which, because of raw material, technological or geographical factors, can be economically made by the company in question.

The development of these products which are new to the company, but



not new to industry, requires individuals of outstanding technological ability who are well versed in the scientific literature and have some knowledge of the fields of use. The emphasis in this case is on technological ability. The development of these products requires a keen perception of which markets are expanding, which are the most lucrative, and which compounds fit most naturally into the company's manufacturing scheme.

The development of products new to the company, but not new to industry, is sometimes called "stern chasing." However, in a free economy this process is the means by which the most desirable product and most economically sound manufacturer are selected through the normal means of free competition.

PROCESS DEVELOPMENT

The development and maintenance of economic processes for manufacture of chemicals is the backbone of the chemical industry. Once a feasible new product has been found in any of the above categories, the battle is far from over. It is only well joined. Unless an economic process can be found the new product cannot emerge from the curiosity stage. Unless the best balance of manufacturing cost and capital risk is found, the new product is exposed to a rapid competitive death if it is placed on the market.

For process development work, individuals are required who have not only a broad background in chemical science, but who think of reactions in terms of feasible plans and of the limitations imposed by equipment, instruments, and the capabilities of technical and non-technical workers. The requirement is essentially for a well-grounded technical man who is possessed of a good measure of practical sense.

Process development work is sometimes regarded as boringly routine. It does involve repetition. Such repetition is demanded because of the importance of precision in process work. Many dollars of investment will be risked on the outcome of the process development work and the risk must be minimized. In many cases the process development man's work is more difficult than exploration. New products are of interest for their newness, even if it is later found they have little utility. Other new products can be found. The process man, however, must make a given product for not more than a given cost. These are severe limitations from which there is no escape.

APPLICATION RESEARCH

Application research is a term which has grown up in the industry in the last relatively few years. It has two basic aspects. In one case application research deals with the requirements of consuming industry. These are analyzed in terms of potential chemical solution. This aspect is closely tied to the development of new products. In the other aspect, existing products of the chemical company under consideration are analyzed in terms of their physical and chemical properties which might lead to potential new uses. Thus, it might be said that application research faces both inward and outward, and in the second aspect mentioned above, covers the category of work previously described as the development of new applications for existing products.

For the job of developing new applications for existing products, individuals are required who can visualize chemicals in terms of uses and vice versa. Their knowledge of technology and basic chemical science need not be as profound as is required in the other categories of research jobs. However, the requirements in terms of imagination are quite critical.

PRODUCT IMPROVEMENT

Finally, the improvement of existing products embraces in part all of the above categories. It is necessary to keep abreast of the literature, to take advantage of the development of new materials which may be related to the existing products or new methods of processing which may cheapen the existing products. It is necessary to keep close track of competitive products in order that improvements in them may be incorporated in one's own product so that a competitive disadvantage is not felt. It is necessary to keep in close touch with the uses for the product in order that increasingly severe demands from a use point of view may be met by improvements in the product and decrease in cost.

Such work on the improvement of existing products normally is the result of joint efforts of all the individuals described previously.

In the light of the above objectives, then, some sketch of an industrial research laboratory organization can be made. In the case of small companies the problem is fortunately easy. A small group of very highly trained men will need very little in the way of formal organization to accomplish the functions given above. The difficulties in formulating an industrial research laboratory organization arise in the case of large companies where scores or hundreds of highly skilled technical individuals must be organized for maximum efficiency.

ORGANIZATION

It is natural that a small group will grow to the point where it will require a supervisor. It is also natural that this group may continue to grow to the point where it needs sub-division in order to relieve the supervisory load. While it would be perfectly possible to have a very large group of technical people working virtually independently with very little supervision, chaos would quickly result.

DIVISION INTO GROUPS

Industrial research organizations are therefore habitually divided into groups. The size of such groups is a point of considerable debate. There are those who favor large groups and those who favor small groups. In industrial research organizations involving the employment of a considerable number of non-technically trained individuals, the large group is most apparent. Where there is a high level of individual responsibility, the small group is a very efficient organism. The small group also has the advantage of making the problem of "on the job" training simpler by virtue of intimate contact among all of the members of the group from day to day. By virtue of a multiplicity of small groups also, the number of individuals who receive basic training in administrative problems is increased and the number of these who are potentially promotable to positions of greater administrative responsibility is increased.

A small group organization can be set up on the basis of groups of one to five men. All of the men should have some training in all of the functions of the research laboratory as given above, i.e. the development of new products, the development of new processes and the maintenance of existing processes, application research and the improvement of existing products. However, it is only natural that some of the members of the group will have leanings more in one direction than the others. Through the balance of these interests and capabilities, the efficiency of the groups can be maintained at a high level. In such small groups the personnel are largely, if not exclusively, technically trained and will consist of a mixture of chemists and chemical engineers.

GROUP LEADER

As the work of the individual groups grows in scope, it is quite frequently found that fields of application research are entered which require the establishment of test methods depending on a simulation of use conditions. The equipment necessary for this purpose is usually quite complex and expensive and, as the amount of such work done grows, quite frequently a group parallel to the original research group will be set up to handle such application research. This group not only manipulates the equipment and handles the application research end of the work, but also maintains primary contact with field developments.

In any such group, one member, who by virtue of administrative ability, technical stature and experience, is more advanced than the other members, will be designated as the group leader.

Since the position of group leader usually provides the individual with his first chance to demonstrate his administrative ability, the assumption of this position involves considerable risk, at least for the initial period until such administrative ability is demonstrated in practice. Moreover, the group leader is the fundamental administrative unit of the research organization. He provides technical leadership for his group, apportions the work among the group, counsels and advises on the carrying out of the work and is the primary trainer of new men. He also provides liaison with the sales, production and design departments, wherein originate a good many problems of the industrial research laboratory.

SERVICE FUNCTIONS

Every industrial research organization has to have some scientific literature facility, and this usually results in the establishment of a library group.

Similarly, some equipment must be available for somewhat larger than bench-scale manufacture of samples and to provide a place for accumulation of the information necessary for the design of large-scale plants. This usually results in the establishment of a pilot-plant group which carries out such functions and, in addition, quite frequently engages in manufacture of products on a routine basis while their market is yet small.

Because of the special background required, it is also conventional to have an engineering group whose responsibility is the construction of new equipment, facilities and pilot plants.

In every organization the chemist starts out doing his own analyses until the organization grows sufficiently large so that a central research analytical group can be justified. This group's initial function usually is the performance of analyses for the remainder of the laboratory. However, there is usually added to this the function of developing new methods of analysis. In this connection it might be mentioned that, since all industrial processes depend on analyses for control and for regulating cost, the necessity for high-grade analytical methods and high-grade analytical research cannot be too heavily stressed.

As the organization grows, the necessity for physico-chemical measurement and for expensive and complex physico-chemical equipment becomes sufficient to justify the existence of a separate physical chemistry group. This group, as the analytical group, operates in conjunction with all of the groups of the laboratory to handle the physico-chemical parts of their problems.

Further growth of the industrial research laboratory and its associated plant usually necessitates the establishment of a group within the research organization to do minor plant investigation work and also to serve as a fact-finding agency in the event of production trouble. This group is usually associated with the engineering function and is quite frequently paralleled by a group of more experienced and mature engineers who perform preliminary manufacturing cost and capital cost calculations to relieve the individual research groups of detailed responsibility in this direction. This group also functions in consultation with all of the laboratory groups to provide engineering critiques of the processes developed by the individual laboratory groups.

One of the necessary evils of all industrial research work is that of properly recording and reporting the result of the individual's work so that all other members of the organization may have the benefit of his findings. This leads to a sometimes voluminous system of company reports and considerable exchange of correspondence within and without the company. To handle all of this it becomes essential to establish some secretarial service within the research department. Normally such secretarial staff is drawn from the usual sources of such employees. The non-technically trained secretary usually requires a considerable number of years of experience before functioning efficiently as a research secretary.

The above are the essential building

(*Turn to page 452*)

How PURE do you want your H_3PO_4?

DESCRIPTION

Chemical formula: H_3PO_4
Specific gravity: 1.692 (20°C/4°C)
Freezing point: 21°C (70°F)
Viscosity relative to water at 25°C (77°F): 43.5
Turbidity: none

CONTAINERS

Stainless steel drums:
55 gal.—750 lbs. net.
ICC carboys:
13 gal.—180 lbs. net.
6½ gal.—90 lbs. net.
5 gal.—70 lbs. net.

V-C PHOSPHORIC ACID, N. F. Grade, is guaranteed to contain 85% free phosphoric acid. It surpasses National Formulary and American Chemical Society specifications and meets all U. S. Food and Drug Administration regulations.

This odorless, water-white, sparkling-clear, syrupy liquid is made from elemental phosphorus and is believed to be the purest phosphoric acid produced in the world today.

V-C Phosphoric Acid, N.F. Grade, is ideally suited for use in pharmaceuticals and other chemical products where unsurpassed purity is indicated.

V-C Phosphoric Acid, N.F. Grade, is produced in the most modern plant of its kind, on the site of the first phosphate mine and phosphoric acid plant in the U. S.

VIRGINIA-CAROLINA CHEMICAL CORPORATION
Chemicals Division: *401 East Main Street, Richmond 8, Virginia*

PHOSPHORUS
PHOSPHORIC ACIDS
85% N.F. Grade • 85% Technical Grade
75% Food Grade • 50% Food Grade • 62½% Commercial Grade
SODIUM PHOSPHATES
Disodium Phosphate (*Technical and Drug Grades*)
Trisodium Phosphate • Tetrasodium Pyrophosphate
Sodium Tripolyphosphate
CALCIUM PHOSPHATES
Monocalcium Phosphate • Lucky Leaven® Phosphate
Phosphate Paste

VC CHEMICALS®

DETERGENT MANUFACTURERS!

NOW YOU CAN PACK IN A&S MULTIWALL PLASTO-PAK BAGS

PLASTO-PAK Paper bag are economical
PLASTO-PAK Paper bags are easy-to-pack
A&S
POLYETHYLENE MULTIWALL BAGS
Delivered empty multiwalls save up to 10 times the shipping space of other packages.

RECENT DEVELOPMENTS FROM THE A & S PACKAGING LABORATORY

- **EXPENDABLE PALLETS** — Palletized shipment of A&S bags lower your handling costs, minimize storage space.
- **STA-STAK BAG** — Creped outer wall takes skid and slip out of stacking. Greater resiliency, easier handling.
- **SHUR-CLOSE** — Ingenious bag valve assures less dust when packing — less sifting when packed — prevents waste.
- **SUPER GLOSS FLOUR BAG** — Toughest of flour bags is bright white with brilliant inks to provide sparkling, appealing shelf packages.
- **ARK-TONE PRINTING** — Sharp, clear color process combines perfect reproduction and brightness for consumer packages.
- **HI-TONE PRINTING** — Strong, deep colors for sugar, salt, rice and similar bags.
- **PRESSUR-PAK BALE** — Bags are packed under pressure. Saves 50% of customers' space allotted to storage.

Manufacturers of Synthetic Detergents and other hygroscopic materials now using rigid containers should consider packing in easy-to-fill, easy-to-handle A&S Plasto-Pak Multiwalls because of the terrific saving in bag price *and* lower storage, freight, packing and handling costs.

This newly developed multiwall bag consists of several walls of specification kraft with inner liner coated with polyethylene. This polyethylene kraft construction gives proven protection against moisture and chemical reaction. A newly developed "Electro-Seal" (Patent applied for) closes off the needle holes at the bottom of each Plasto-Pak bag. No other multiwall bag has this feature.

ARKELL & SMITHS · 90 YEARS OF KNOW HOW · THE OLDEST NAME IN PAPER BAGS ·

ARKELL and SMITHS

CANAJOHARIE, N. Y. • WELLSBURG, W. VA. • MOBILE, ALA.

THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

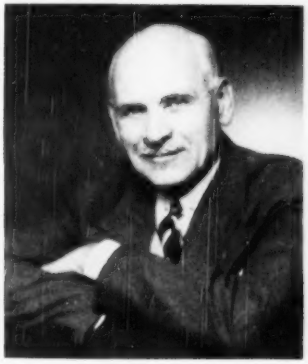
PEOPLE

L. P. SEYB, appointed manager of research, Diamond Alkali Co. Since 1942 he has been a chemist and group leader in the research department.

CARL S. MINER, who will receive the 1950 Honor Scroll of the American Institute of Chemists on October 13th.

HAROLD WITTCOFF, who has recently been appointed head of the newly created product development section at General Mills Research Laboratories.

G. M. HALSEY, named director, manufacturing, Chemical & Pigment Div., Glidden Co.



JOHN C. H. WENDES, named production mgr. for Naugatuck Chemical Div., U.S. Rubber Co.

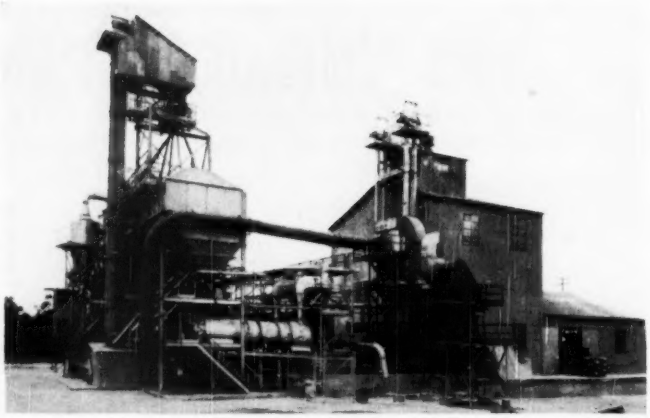
GUSTAVUS J. ESSELEN, elected vice president of the Society of Chemical Industry.

POPPED ROCK

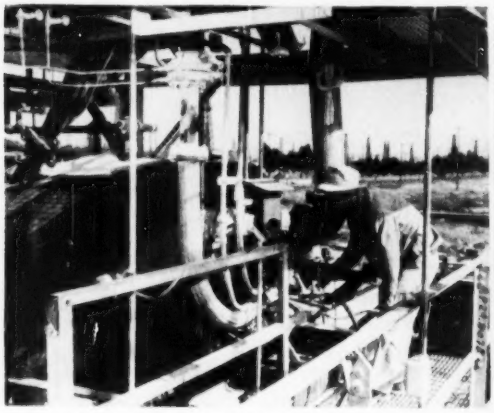
Sizable expansion makes Great Lakes Carbon Corp.'s expanded perlite plant at Torrance, Cal., country's largest.

COMPLETED originally in 1946, Great Lake Carbon's perlite processing plant on the West Coast has since been revamped and expanded to four times its initial capacity. It now processes 150 tons of ore a day. A companion plant at Linden, N. J., makes the company the largest producer of expanded perlite in the U. S.

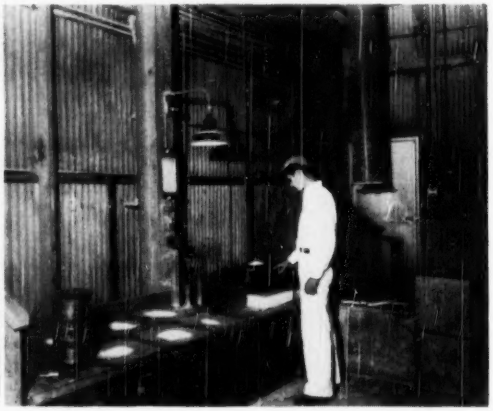
A volcanic rock, perlite weighs 65 to 85 lbs./ft.^{3}, but when heated it becomes an inorganic "popcorn" weighing only 2 to 20 lbs./ft.^{3}. It is used to make light-weight plaster, concrete, stucco and insulation.



ONE HUNDRED AND FIFTY TONS a day of processed perlite is turned out by Great Lakes Carbon Corp.'s recently expanded Torrance, Calif., plant. The material is used as a light-weight building aggregate.

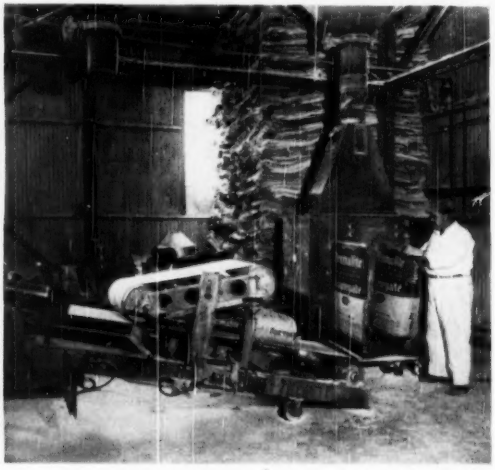


CRUSHED AND SIZED ORE is fed by conveyor to one of two gas- or oil-fired rotary kilns, each of which can process 75 tons a day.



RAW ORE is sampled six times daily and examined for particle size and moisture content—variables which determine process conditions.

PARTICLE SIZE of both raw and finished aggregate is determined by means of a sieving device according to ASTM standard procedure.



FINISHED PRODUCT is packed mechanically into paper bags. Day, hour and minute of production stamped on bag aids in quality control.

HIGHLY REACTIVE PHOSPHORIC ANHYDRIDE...

another VERSATILE VICTOR CHEMICAL

The properties of Victor phosphoric anhydride make it useful in many manufacturing processes. The following applications are typical and show the variety of uses which have been developed:

- **GAS DRYING AGENT**
- **CATALYST**
- **REAGENT IN METHYL METHACRYLATE RESINS**
- **ORGANIC PHOSPHATES**

If you are looking for ways to increase efficiency and reduce production costs, why not consider the application of Victor phosphoric anhydride? Write today for quotations, technical data, or samples.

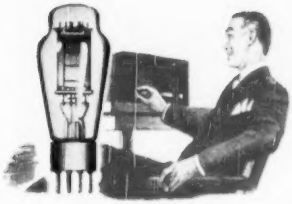
Typical Reactions of Victor Phosphoric Anhydride

$$RCOOH + R'OH + P_2O_5 \rightarrow RCOOR' + 2HPO_3$$

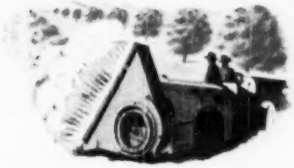
$$R_2O + P_2O_5 \rightarrow 2RPO_3$$

$$3R_2O + P_2O_5 \rightarrow 2R_3PO_4$$

$$3ROH + P_2O_5 \rightarrow RHPO_4 + RH_2PO_4$$



GAS DRYING AGENT—RADIO TUBES



ORGANIC PHOSPHATES—INSECTICIDES

CATALYST—ASPHALT IN IRRIGATION DITCHES

REAGENT IN METHYL METHACRYLATE RESINS

VICTOR CHEMICAL WORKS

141 WEST JACKSON BOULEVARD • CHICAGO 4, ILLINOIS

A. R. Maas Chemical Co., Division

4570 Ardine Street, South Gate, California

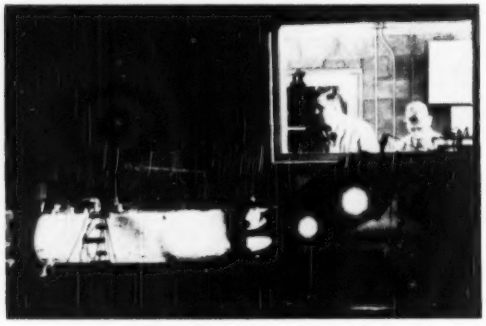
FREE ENTERPRISE IN JETS

Texas Co. sponsors its own jet propulsion research at Beacon, N. Y., laboratories.

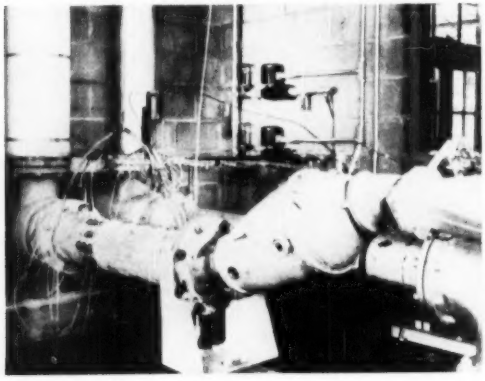
THE TEXAS CO.'S new jet propulsion laboratory has now gone into operation at the company's research center at Beacon, New York. It is believed that this is the first large industrial jet lab to be financed entirely by private funds. Heretofore, most U. S. jet research has been sponsored by the government for military purposes.

The new laboratory will be used to test both petroleum components and a wide range of organic and inorganic chemicals which possesses promising power characteristics. The lab includes a combustor test section and compressor room equipped with wall-size rolling doors which facilitate test operation. Pratt and Whitney combustors have been installed in the combustor section. Engines in which combustors of this type are used develop over 5,000 pounds of thrust and are among the most powerful in production. They are installed in high-performance aircraft such as the Navy's Grumman Panther. Specially constructed quartz windows permit scientists to study the combustor interior. Exhaust gases from gas turbine combustion travel at speeds of 1,000 feet per second and reach temperatures of 1,600° F.

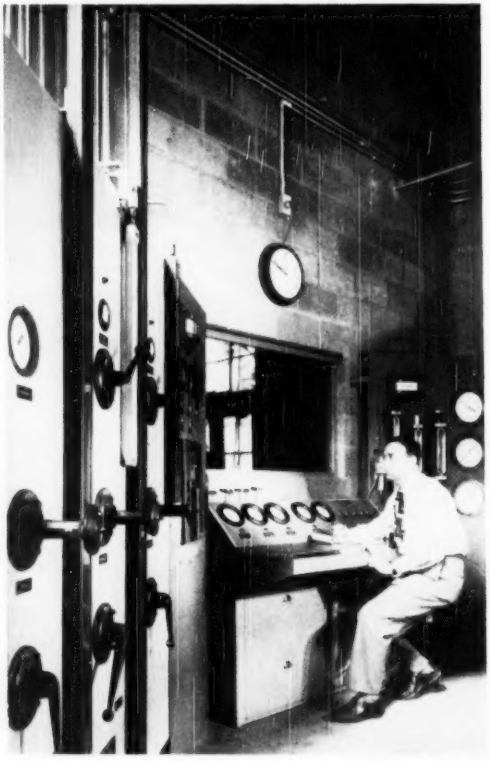
JET LAB BUILDING. Combustor section is at left and compressor room on right. Tank in foreground cools and slows down high-velocity exhaust gases.



COMBUSTOR INTERIOR. Specially constructed quartz windows permit scientists to study the combustor in operation.



COMBUSTOR TEST SECTION. Piping at left is a heat exchanger which cools the exhaust gases and heats the inlet air.



INSTRUMENT PANEL. Simplified automatic control permits single operator to conduct tests over a wide range of operations.

SULFRAMIN* E

Excellent detergency

Maximum hard water protection

Amazing low cost!

You, who are always on the alert for better products at lower costs, will really appreciate Sulframin E Liquid. This new synthetic, organic detergent offers you superior detergency—especially on cellulose fibres—together with amazing resistance to hard water and lime soap.

Sulframin E Liquid also offers you unusual wetting and penetrating powers—even in the presence of hard water, acids or alkalis.

Your cost, based on the percentage of active organic material, is extremely low. Moreover, Sulframin E Liquid reaches you ready to use, thus saving both your time and labor.

Your copy of our Sulframin E Liquid catalog will be forwarded promptly on request. Write for it.

Available in drums, tanktrucks and tankcars.

Distributors' Inquiries Invited

ULTRA Chemical WORKS

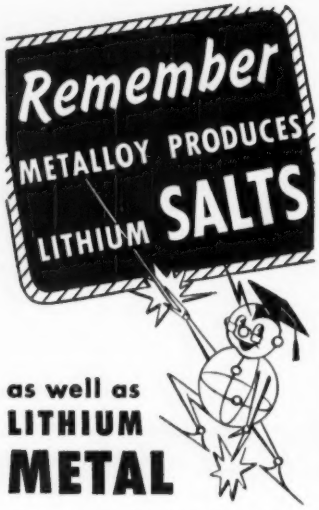
*T.M. Reg. U. S. Pat. Off.

ULTRA CHEMICAL WORKS, INC.

Paterson, New Jersey — Joliet, Illinois

IN CANADA: Delta Chemical Works Corp., Brantford, Ont.

IN MEXICO: Icon, S. A., Mexico, D. F.



as well as
LITHIUM
METAL

The unique chemical and physical properties of Lithium Salts made inevitable their recognition and use in many specialized chemical applications. Their general low molecular weight and low melting eutectics with other salts are but two reasons for their ever increasing acceptance.

Lithium Salts have indeed demonstrated their value in the Ceramic, Welding, Chemical Manufacturing, Pharmaceutical, Air Conditioning, and Grease and Wax industries. Certain products produced by these industries largely owe their superiority to the distinct properties of Lithium Salts.

Look to Lithium Salts as a possible answer to your production problem. And when you consider Lithium, look to Metalloy as a reliable supplier. As specialists, Metalloy has developed many Lithium Compounds hitherto unavailable for commercial use.

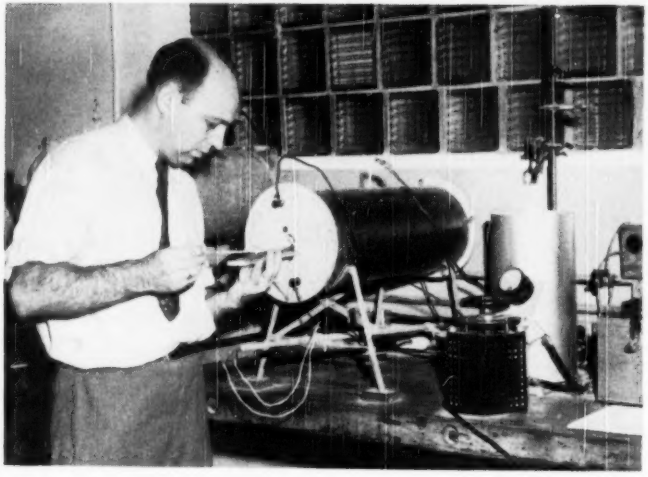
Write Dept. A for prices, samples and further information.

LITHIUM
- ALUMINATE
- BORATE
- CARBONATE
- CHLORIDE
- COBALTITE
- FLUORIDE
- HYDROXIDE
- MANGANITE
- MOLYBDATE
- SILICATE
- TITANATE
- ZIRCONATE
- ZIRCONIUM SILICATE

• *Available in tonnage or experimental quantities.*

If It's Lithium—Call Metalloy!

METALLOY CORPORATION
GAND TOWER MINNEAPOLIS, MINN.



APPARATUS developed by the Bureau of Standards for study of high temperatures in glass.

CRYSTALS OF GLASS

A RAPID, NEW method has been developed by the National Bureau of Standards for study of crystallization in glasses. In the development of new glass compositions the most important limitation has been devitrification, the formation of crystals in the glass at high temperatures. Two properties of a glass which greatly influence divitrification are the rate of crystal growth and the highest temperature at which molten glass can exist in equilibrium with crystals. Most methods to determine these properties have involved repeated heatings at different temperatures. The Bureau's method employs only one heating in a special platinum alloy apparatus with a gradient furnace.

WORLD'S LARGEST research laboratory devoted to the development of safety equipment.

STUDY OF SAFETY

THE WORLD'S largest research laboratory devoted exclusively to the development of safety equipment was recently opened by the Mine Safety Appliances Co. The facilities will be used to develop safety devices to combat hazards of all types. Among the projects planned are instruments for use in such relatively new fields as air pollution and atomic energy.

The four story laboratory building includes high altitude chambers; dust, fume and gas chambers; a wind tunnel, and an electron microscope.

From SHELL CHEMICAL

DTBP

(Di-Tertiary-Butyl Peroxide)

$(CH_3)_3C\text{-}O\text{-}O\text{-}C(CH_3)_3$

Stable polymerization catalyst ...at a new lower price

Shell DTBP provides many unique advantages as a catalyst for moderately high-temperature resin polymerization. Now the economy of reduced cost has been added to these qualities:

Stability... DTBP is insensitive to shock...can be stored without composition change or danger of explosion. Its decomposition rate is uniform ...governed entirely by the temperature of operation, independent of kind of monomer, prepolymer, or reaction medium.

Color and Clarity... DTBP leaves no color forming bodies, no acid residue... helps to produce lighter colored polymers... particularly suitable for styrenated alkyds, polystyrene and styrenated oils.

Ease of Handling... no special precautions required... non-corrosive and readily soluble, not only in most resin monomers, but also in viscous partial polymers.

High Catalytic Efficiency... a high degree of conversion from monomer to polymer is obtained with DTBP per unit weight of catalyst.

DTBP is available in commercial quantities, *and is shipped in 1-gallon, 5-gallon and 15-gallon containers.*

PROPERTIES of DTBP

Molecular Wt.	146.22
Spec. Gravity, 20°/4°C.	0.7940
Refractive Index, 20/D	1.3890
Melting Point, °C.	−40.0
Boiling Point, °C (760 mm.)	111
Flash Point (Tag Open Cup), °F.	65
Solubility in water, 20°C (wt. %)	ca. 0.01

Samples available. Technical literature and a sample of DTBP for your own evaluation will be sent on receipt of your letterhead request.

SHELL CHEMICAL CORPORATION

CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE

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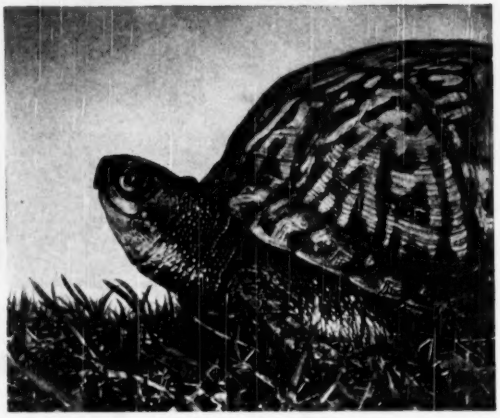
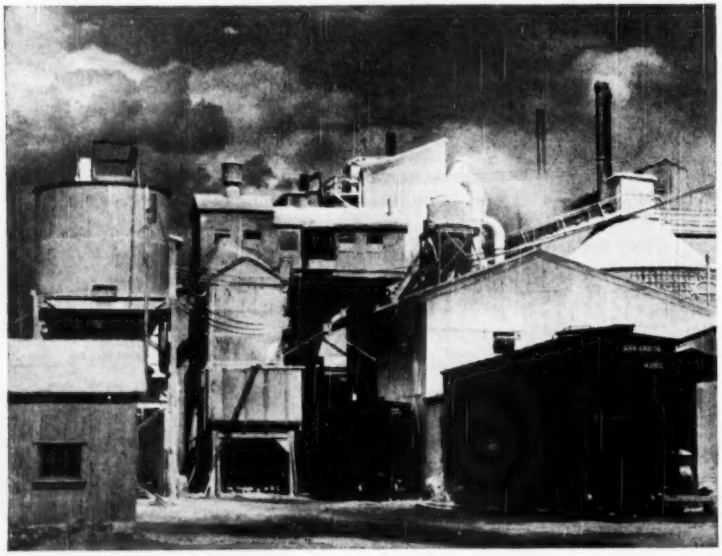
Life ...on the

ONE OF THE USES OF Cyanamid's AERO* Brand Guanidine Carbonate is to preserve the free-flowing characteristics of soap powders and other granular-type detergents which tend to cake or "lump" in storage. This use is just one of the many interesting applications being developed for the new guanidine compounds now commercially available from Cyanamid. Further information and technical data on these newer nitrogen derivatives is available on request. The coupon is for your convenience.



LOOKING FOR A HARD, DURABLE PROTECTIVE COATING to give long, useful life? The paint industry is finding one answer in modern surface coatings formulated with resins made from AERO* Brand Phthalic Anhydride which impart extreme hardness, toughness and durability to the protective film.

Other major uses of Phthalic Anhydride include the manufacture of chemical plasticizers, vat dyes and phthalocyanine pigments. As one of the leading producers of this basic chemical, Cyanamid will welcome your inquiry.

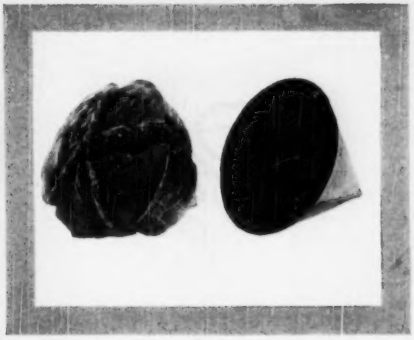


"A RAINCOAT FOR CEMENT" is one way to describe the action of AERO* Brand Calcium Stearate in waterproofing specialty cements. Also of interest to cement manufacturers is the fact that in addition to increasing water resistance in specialty cements, Calcium Stearate is also widely used for cutting grinding time and reducing caking in the bag. Calcium Stearate is also used in the manufacture of cement paints to increase their waterproof qualities.

*Trade-mark

Chemical Newsfront

STRENGTHENING THE SINEWS OF STEEL—that's the job Calcium Cyanamid 6-16 accomplishes when used to add nitrogen to steel. Only small amounts are needed to make tons of steel harder . . . to improve stiffness, corrosion resistance, and machinability. These advantages plus other features, such as freedom from dust and convenient packaging in paper bags, have made Calcium Cyanamid 6-16 a favorite in the manufacture of open hearth steel.



CRAZE-RESISTANCE is not a term of the psychiatrist, but instead, of the adhesives expert. It describes the ability of an adhesive to resist cracking and crumbling after it has set. URAC® 185 Resin Adhesive, shown at the right in the photograph, has this characteristic to a high degree. The ordinary type urea glue shown at the left does not. To receive literature describing URAC 185 more fully, check the attached coupon and send it in today.

American Cyanamid Company
Industrial Chemicals Division
30 Rockefeller Plaza, New York 20, N. Y.

C. I.—9-50

Please send information on the items checked.

- ☐ AERO® Brand Guanidine Carbonate
- ☐ AERO® Brand Phthalic Anhydride
- ☐ AERO® Brand Calcium Stearate
- ☐ Calcium Cyanamid 6-16
- ☐ URAC® 185 Resin Adhesive

Name _____ *Position* _____

Company _____

Address _____

State _____

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.

PRICE ANNOUNCEMENT

Pfizer CITRIC ACID

To all our customers, Chas. Pfizer & Co., Inc. guarantees that there will be no advance in the present domestic prices of Pfizer Citric Acid for at least one year from September 1st, 1950.

PFIZER QUALITY ®

PFIZER

Manufacturing Chemists for Over 100 Years

CHAS. PFIZER & CO., Inc.
630 Flushing Avenue, Brooklyn 6, N. Y.
425 North Michigan Avenue, Chicago 11, Ill.
605 Third Street, San Francisco 7, Calif.

APPEAL to both sexes for deodorant soap is achieved by deep salmon color scheme with eye appeal, legibility, remembrance value. Stylized clock emphasizes claim, "Round the clock protection."

MERCHANDISING IDEA of "five quarts for price of four" strikes buyer through numerical emphasis that attracts attention, stimulates impulse sales. Underscoring numbers in black heightens effect.

Is Your Package a Strong Sales Weapon?

by ROBERT SIDNEY DICKENS, President
Dickens, Inc., Chicago, Ill.

WOULD YOU LOOK for a job in an old suit? Your package reflects the quality of its contents too, so don't burden a good product with a container that won't sell. Learn to spot good sales apparel.

PACKAGES that sell are the aim of every manufacturer of a consumer product. And well-known labels, logotypes, package shapes and color combinations that ring a bell in the buyer's mind are the envy of any producer who has brought forth a shelf-warmer.

What makes one package a good one and another a poor one?

A look at the accompanying illustrations of some of the packages for chemical specialties that have been designed by the Dickens organization will illustrate design principles that will be discussed further below.

Since Dial deodorant bath and toilet soap was developed for use by both sexes, a design had to be created that would appeal to both without embracing too much feminity or masculinity. The general color scheme of deep salmon was selected for maximum appeal to both, and deep brown was used for contrast. Though the primary consideration in picking deep salmon was this dual appeal, the color could not have been employed if it did not have good eye appeal and display value, excellent legibility, and strong remembrance value. The stylized clock used in conjunction with the logotype "Dial," emphasized the product claim, "Round the clock protection."

A problem quite apart from selling to a mixed audience at drug and cosmetic counters is the design of the Master Painters can. Here the package had to reflect a unique merchandising idea, that of selling "five quarts for the price of four." In order to leave no doubt in the purchaser's mind that he was getting five quarts, numerical emphasis was employed. This had to be effective and unusual to attract the attention of a prospective customer in a

paint, hardware or department store and stimulate him to buy. Dramatic emphasis was heightened by underscoring each of the numerals in black.

How to identify products as belonging to your line and yet make clear the function of each is a problem most specialty manufacturers face. The Window Glaze and the floor paste are a part of the Simoniz household line. Dickens employed a loose family resemblance in designing this line. On each of the products the logotype, "Simoniz," appears in reverse block form for instant product identity. A posterized window effect was used on the Window Glaze to tell the story quickly and effectively with maximum simplicity and minimum copy. The lithographed can is double-faced with the same design on the other side in order to achieve maximum benefit no matter how displayed. Sell copy on the floor paste container was placed diagonally around the can so product identity would be secured from any angle.

HOUSEHOLD LINE has loose family resemblance with "Simoniz" logotype in reverse block form on each for instant product identity. Posterized window effect tells Window Glaze story simply. Diagonal sell copy identifies floor paste from any angle.

REASON FOR REDESIGN

Often a product label or package suffers with the passage of years much as does the attic or cellar—a little something is added every now and then until the whole thing becomes so cluttered that what should be easily located can't be found. The new design of the cluttered and outdated Linco bottle retained many of the established identity factors found on the old labels. The same colors of red, blue and yellow were still used, as was the general style of the logotype, "Linco," although with modern treatment the latter was sharpened and made more visible. More emphasis was given sell copy so the consumer could see at a glance that the product "Disinfects — Deodorizes — Removes Stains." The word "bleach," missing from the old label, was given an important position in the new label to attract the consumer's eye.

Not all the reasons for changing a design are as obvious as the above. The new design developed for Chiffon Flakes, however, is of particular significance to manufacturers whose products are widely advertised. The rainbow effect utilizing many colors at the bottom of the old package was changed to a solid light blue with white soap flakes tumbling down. This gave a very effective package that reproduces better than the old in all types of advertising.

NEW DESIGN (right) cleaned up cluttered, outdated label, while retaining the original colors. Customer can see at a glance that product "Disinfects—Deodorizes—Removes Stains." Word "bleach" was added for extra sell. Modernized "Linco" logo is more visible.

REDESIGN is often quite subtle. Rainbow effect of many colors at bottom of package (left) was replaced by solid light blue with white soap flakes tumbling down. Better reproduction in all types of advertising can now be obtained with the new package.

Cotton and the ULTRAWETS

From raw cotton to finished fabric . . . much of the processing involved can be improved by using the ULTRAWETS—a family of alkyl aryl sulfonates tailor-made for particular jobs. For example:

In soaping off after dyeing and printing: Liquid ULTRAWET 35KX is the most economical alkyl aryl sulfonate for volume use. Flake ULTRAWET K or bead ULTRAWET SK where dried products are desired.

In dyeing and printing: The liquids ULTRAWET 30E and ULTRAWET 30DS are particularly efficient as dye leveling and penetrating agents.

In kier boiling: Liquid ULTRAWET 35KX has excellent penetrating, emulsifying and detergent properties to help remove the natural waxes, pectin and soil from the cotton.

Cotton is just one of the textile fibers with which the ULTRAWETS are being used. They are equally important in the processing of wool and synthetic fibers. We will be glad to send you a brochure which will give you facts about the whole ULTRAWET family—liquids, flakes and beads. The Atlantic Refining Company, Chemical Products Section, 260 S. Broad St., Philadelphia 1, Pa.

ATLANTIC
PETROLEUM
CHEMICALS

In the East
THE ATLANTIC REFINING COMPANY
Philadelphia • Pittsburgh • Providence
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On the West Coast
L. H. BUTCHER COMPANY
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In Canada
NAUGATUCK CHEMICALS
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Elmira • Montreal • Toronto • Windsor
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CMC
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Chemicals
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SODA SULPHIDE
CHEMICAL MANUFACTURING CO., INC.
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21 WEST STREET
BOWLING GREEN 9-5360
SAN FRANCISCO
25 CALIFORNIA ST.
YUKON 6-3787

In all of the above cases, the designer has given consideration to basic design concepts that hold for all products regardless of their nature. Ignoring any one of them can result in a merchandising failure. The package design must:

- **Provide extremely fast product identity.** Shelf standout has to be achieved because of the many competitive products on display in most stores.
- **Provide the buyer with quick information.** The consumer demands to know at a glance the story on contents, where used, how used, cost.
- **Reflect the feminine approach.** The package must be what a woman as a representative of the largest buying segment expects it to be in suitability for use, storage or display, and in tone. This is especially true of household specialties.
- **Provide the quality mirror.** The package must reflect the quality of the product housed inside and do it in rather honest, sincere terms. A 29-cent box of soap should look like a good 29-cent box of soap that will wash dishes or clothes efficiently. An attempt to use design implications to claim more than can be expected from a product may fool the housewife once, but not twice.
- **Project the end use.** Packages of nationally known products are reproduced in all types of advertising from matchbook covers to billboards, from magazine covers to television screens, and from company letterheads to truck decalcomania. A package that embodies in its design the function of the material for sale carries a tremendous sales punch wherever it is shown.

Developing a package that provides these essentials is what is meant by styling the package. It is not, as is often thought, making the package pretty to look at, but rather, making it easy to sell. To provide a design solution that will give a product maximum sales impact, the designer must combine his technical talents with all the information the manufacturer can give on the item in question.

INFORMATION FOR DESIGN

This information, which is the base on which the package is built, flows from the sales, advertising, legal, production and purchasing departments of the manufacturer. Some of this will come directly from the departments involved in response to the designer's questions. Quite often today, it stems directly from top management which realizes that package development is tied in with production and sales levels. Typical of the questions that concern a designer are the following:

What types of stores will sell the product? This will tell him such things as whether it is a medium priced product, or a "class" item. Obviously the tone of a product packaged for an exclusive cosmetic house will differ from one packaged for sale in a ten-cent store.

What classes of consumers will buy the product? If women are to buy the item, the type of design will differ from that used if it is for male consumption. Similarly, an item to be sold in a rural area will probably be packaged differently from one designed primarily for sale in the city.

How much of the selling will rest on the package's shoulders? If there is a big advertising budget and the product is to be distributed nationally, the amount of copy on the package can probably be less than if it is to get little or no advertising support.

At what distance must the package be identified? A box of laundry bluing on the bottom of a grocer's shelf will have to fight for recognition harder than a box of toilet soap on a druggist's counter.

How is the package shipped? This will have a direct bearing upon the materials from which the designer can make his selection.

What protective measures are required against temperature, moisture, etc.? Here again, the physical properties of the material may limit selection of types of containers.

In what form is the package received in the manufacturing plant? The amount of work still to be done on the package and the plant's ability to do it, will effect the choice of design.

What are the filling and labeling methods, and what types of packaging machinery will be utilized? A design may be worth new filling equipment if it calls for it, or conversely, the designer must fit his design to existing equipment.

Is the package immediately destroyed in the home, or is it used to store the contents until empty? One obvious implication of this information is whether the package has to stand just one handling or repeated use.

Is the package designed for reuse? If the material can best be packaged in a container that can

Recommended reading for research chemists...

CONCISE, INFORMATIVE LITERATURE ON ARMOUR'S

"Chemicals from Fats!"

Whether you make cosmetics or germicides, crayons or rust preventatives, synthetic detergents or printing inks, polishing waxes or paints, carbon papers or plasticizers . . . you'll want to know more about Armour's versatile "Chemicals from Fats."

Write for the following free booklets to see how these high molecular weight aliphatic chemicals can help you.

Armeens*—Fatty Amines

The Armeens, high molecular weight aliphatic amines having alkyl chain lengths of 8 to 18 carbon atoms, and their water-soluble acetate salts, the Armacs*, are used extensively as ore flotation reagents and also as a base for many of the new high potency quaternary salt germicides. Their many other uses include cationic emulsification, synthetic detergents, penetrants and repellents.

Armids*—Fatty Amides

The Armids are high molecular weight aliphatic amides having alkyl chain lengths of 8 to 18 carbon atoms. These high-melting, wax-like nitrogen containing chemicals are used in printing inks as "all weather" anti-scratch materials. Other uses include emulsion stabilizers and thickeners, dye solubilizers for carbon paper, anti-blocks for plastics, chemical synthesis.

Arquads*—Quaternary Ammonium Salts

The Arquads are Armour's alkyl trimethyl ammonium chloride chemicals—ranging from water soluble to oil soluble. They have excellent germicidal properties and surface active properties; are effective also as cationic textile softeners and ore flotation reagents. Other uses include anti-static polishes for waxes, detergents, and alkaline cleaning compounds.

ARMOUR *Chemical Division*

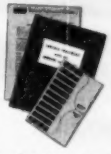
Armour and Company • 1355 West 31st Street • Chicago 9, Illinois

Ethomeens*—Ethomids*—Ethofats*

The Etho-chemicals are polyethylene glycol derivatives of fatty amines, fatty amides and fatty acids. These cationic and non-ionic chemicals have proven themselves particularly valuable as wetting agents, detergents, emulsifiers (and emulsion breakers), and as chemical intermediates.

The Chemistry of Fatty Amines

This twenty-page booklet gives detailed information on the fatty amines and includes sections on synthesis, saturated and unsaturated fatty amines, solubility, handling, quaternary ammonium salts, as well as on chemical coordination and substitution reactions, and cationic surface activity.



Technical Information Bulletins

Other informative bulletins are also available. Among them are: Bulletin #1B, "Armine Retarders and Anti-Scorching Agents"; Bulletin #2D, "Armeels as Plasticizers"; Bulletin #7E, "Sanitizing in the Frozen Fruit Concentrate Industry"; Bulletin #5F, "Compounding Detergents with Ethofat 242/25"; Bulletin #201, "Armid H.T. in Printing Ink"; Bulletin #202, "Armeens and Armacs as Cationic Emulsifiers"; Bulletin #203, "Armids as Mutual Solvents for Waxes and Plastics"; and Bulletin #204, "Armowax."

*Reg. Trademark U. S. Pat. Off

MAIL THIS COUPON TODAY

Armour and Company
1355 West 31st Street
Chicago 9, Illinois
Please send me the booklets checked—

☐ Armeens ☐ Armids ☐ Arquads ☐ Etho-chemicals
☐ The Chemistry of Fatty Acids
☐ Technical Information Bulletins (specify) #_____

Name ..... Title .....

Firm Name .....

Address .....

City ..... Zone ..... State .....

CHECK THE PROPERTIES OF THESE

CASTOR OIL DERIVED

fatty acids

Alkyd Compounding

Both acids are characterized by high degree of chemical reactivity and strong resistance to after-yellowing. 9-11 Acids alkyds provide excellent gloss, adhesion, and durability. Try it for up-grading soya fatty acids.

Plasticizing

P-10 is strongly recommended as a most efficient and economical plasticizer for allyl starch and Zein.

TYPE ➡	DRYING	NON-DRYING
TRADE NAME	9-11 ACIDS	P-10
CHEMICAL NATURE	9-11 LINOLEIC	RICINOLEIC
MOLECULAR WEIGHT	281	296
COLOR (G-H)	2+	10
NEUTRALIZATION VALUE	193	180
IODINE (WIJS)	150	89

APPLICATIONS

Consult our Technical Service Department for further information

9-11 ACIDS — Alkyds, driers, in-situ varnishes, epicholohydrin bis-phenol resin reactions.

P-10 — Alkyds, cosmetics, soaps, grease making, pharmaceuticals, emulsifying agent, plasticizer for allyl starch and Zein.

ESTABLISHED 1857

THE baker CASTOR OIL COMPANY

LOS ANGELES 120 BROADWAY, NEW YORK 5, N. Y. CHICAGO

serve some further use—such as a cheese glass—that is a potent selling factor.

Where is the package stored in the home? If a product is to be kept out on a kitchen or bathroom shelf, more attention to its esthetic values will be given than if it is generally kept in a bottom drawer.

Does the manufacturer have a well-established trade mark? In launching a new product, or a new package, it is well to take advantage of any consumer recognition that has been already built up.

Does existing packaging of the manufacturer have a standard color scheme or a long-established type face? Here again it is best to salvage some of the value of old points. The redesign of the Linco bottles illustrates this.

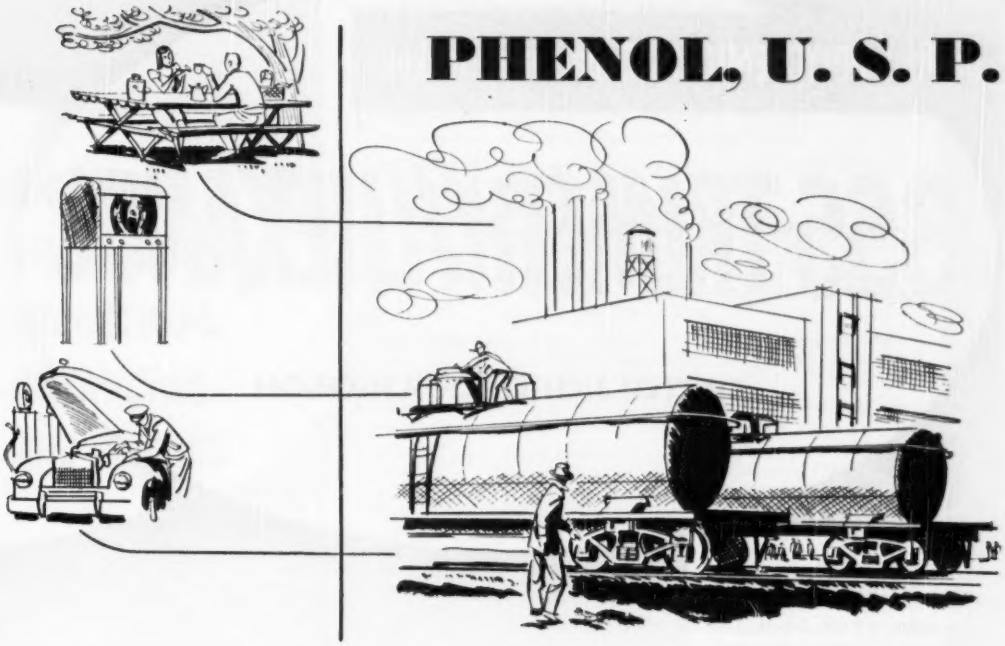
What government requirements exist as to size, labeling, etc.? These facts must be known at the very beginning so that the designer will work within whatever limitations exist.

When the designer has gathered all this information, he will conduct consumer and retailer surveys to determine the importance of each of the basic design factors, and these findings will be reflected in the package design. Specific points checked will include color, illustration, copy and trade mark. Paired comparison tests of two completed designs will often be made for consumer reaction.

Such elaborate steps are necessary to eliminate guesswork, for mass-packaged goods involve such a large expenditure that anything less is pennywise. Once a new design is completed and ready for production, the manufacturer makes a large investment in packaging materials and in some cases, in new packaging machinery. The package must fill the selling role expected of it, or a new product may never achieve the place it deserves.

Manufacturers are realizing that packaging—particularly of articles for retail sale—is as much a part of product development as research, production and sales. The Department of Commerce made note of this trend toward distinctive packaging in a report on containers and packaging last year, and looked for its continuation this year. For many years the food, beverage, cosmetic and pharmaceutical industries have set the pace. Chemical specialties makers, however, are now finding such attention to merchandising design equally rewarding.

Dow is a major producer of



PHENOL, U. S. P.

. . . important to everyday living

Because of its wide, varied use in the manufacture of so many products, phenol is undoubtedly one of the most important chemicals used in American industry.

For example, phenol is used in the manufacture of new bonding agents which make plywood an excellent building material for everything from the home itself to the picnic table in your yard. Phenol is fundamental in the manufacture of thermosetting type plastics used in television set cabinets and telephone receivers. It is also used in refining toluene and lubricating oils, and in the manufacture of lubricating oil additives. Many medicinal products—especially antiseptics—use phenol as a base, while phenolic dyes are utilized in the printing of textiles.

Dow, a pioneer producer of synthetic phenol, is well equipped to satisfy your needs. For those of you who desire a copy of Dow's new booklet, *Phenol—Properties and Handling*, or who desire technical assistance, write us here at Midland.

***DOW ALSO PRODUCES** over 600 other chemicals including: caustic soda, hydrochloric acid, aniline, monochlorobenzene, propylene oxide, epsom salt, ethylene oxide, and other basic, industrial, pharmaceutical and agricultural chemicals.*

THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

Du Pont POLYCHEMICALS Department makes

3,5,5-TRIMETHYLHEXANOL

$CH_3C(CH_3)_2CH_2CH(CH_3)CH_2CH_2OH$

3,5,5-Trimethylhexanol

Description: 3,5,5-Trimethylhexanol is supplied as a colorless liquid having a nonyl alcohol content (by hydroxyl number) of over 97.5%. It boils at 194°C. (381°F.) and freezes below -70°C. (-94°F.). Its specific gravity at 25/4°C. is 0.824 and flash point (open cup) 200° F.

The chemical properties of 3,5,5-Trimethylhexanol are those of a typical aliphatic alcohol. Its chemical reactions include esterification, dehydration, dehydrogenation, and reaction with halogen acids.

Uses—3,5,5-Trimethylhexanol is used as an anti-foam in the leather, paper and textile industries . . . as an intermediate in the manufacture of plasticizers, lube oil additives and synthetic lubricants and as a froth flotation agent in mining.

Already Serving Several Industries, the Properties of Du Pont 3,5,5-Trimethylhexanol suggests many important new uses. Can We Help You Use This and Other Polychemicals Products?

You should know that the Du Pont Polychemicals Department is a source of a broad list of industrial chemicals and plastics; and your Polychemicals' representative has technical knowledge of many of their industrial applications.

3,5,5-Trimethylhexanol is only one of the many alcohols available from the Polychemicals Department. Your Polychemicals' representative can give you or get you technical information on their uses as intermediates in the preparation of plasticizers, lube oil additives and synthetic lubricants, as froth flotation agents for mining, and as anti-foam agents in leather, paper and textile manufacture.

Many Possible New Uses . . . The molecular configuration of 3,5,5-Trimethylhexanol suggests opportunities for its use in the manufacture of solvents for lacquers and other finishing compositions, as a modifier for alkyd resins . . . and many more. If you wish to investigate any that seem promising to you, ask your Polychemicals' man about them. He'll be glad to help you with any specific data available.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Polychemicals

Is YOURS one of the many industries in which Polychemicals' products are used?*

ADHESIVES "Alathon" Polythene Resins • "Arboneeld" Urea-Formaldehyde Compositions • Du Pont Crystal Urea • "Hypalon" Synthetic Resins • Methanol

AUTOMOTIVE "Dehydrol-O" Denaturant • Methanol • 3,5,5-Trimethylhexanol • "Zerone" and "Zerex" Anti-Freezes

DETERGENTS Du Pont Crystal Urea • "Lorol" Fatty Alcohols • "National" Aqua Ammonia

DRUGS & COSMETICS Du Pont Crystal Urea • Dimethyl Sulfate • Methanol • Methyl Formate • "National" Anhydrous Ammonia • "National" Aqua Ammonia • "Lorol" Fatty Alcohols

DYES, COLORS, PIGMENTS Dimethyl Sulfate • Du Pont Crystal Urea • "Lorol" Fatty Alcohols • "National" Anhydrous Ammonia • "National" Aqua Ammonia

FINISHES Adipic Acid • "Arboneeld" Urea-Formaldehyde Compositions • Du Pont Crystal Urea • "Hypalon" Synthetic Resins • "Hytrol" Solvents • Methanol • n-Propanol • Nylon-Type 8

FOOD "Mycoban" Mold and Rope Inhibitor • "National" Anhydrous Ammonia • "National" Aqua Ammonia

INKS "Alathon" Polythene Resins • Dimethyl Sulfate • Du Pont Crystal Urea • Formamide • "Hylene" Plasticizers • "Hypalon" Synthetic Resins • "Hytrol" Solvents • Methanol • "Opalwax" Synthetic Wax • 3,5,5-Trimethylhexanol

LEATHER Hydroxyacetic Acid • "Hypalon" Synthetic Resins • "Lorol" Fatty Alcohols

MACHINERY "National" Anhydrous Ammonia • "Opalwax" Synthetic Wax

METALS Hydroxyacetic Acid • Methanol • "National" Anhydrous Ammonia

PAPER Adipic Acid • "Alathon" Polythene Resins • "Arboneeld" Urea-Formaldehyde Compositions • Du Pont Crystal Urea • Hydroxyacetic Acid • "Lorol" Fatty Alcohols • "Mycoban" Sodium and Calcium Propionate • "National" Anhydrous Ammonia • "National" Aqua Ammonia • Nylon-Type 8

PETROLEUM Diglycolic Acid • Du Pont Crystal Urea • Hydroxyacetic Acid • "Lorol" Fatty Alcohols • Methanol • "National" Anhydrous Ammonia • "National" Aqua Ammonia

PLASTICS Adipic Acid • "Arboneeld" Urea-Formaldehyde Compositions • Du Pont Crystal Urea • "Hexalin" Cyclohexanol • "Hylene" Plasticizers • "Hypalon" Synthetic Resins • Methanol • Nylon-Type 8 • Propionic Acid • 3,5,5-Trimethylhexanol • "Teflon" Tetrafluoroethylene Resin • Nylon Molding Powders • Polythene • "Lucite" Acrylic Resin

RUBBER Du Pont Crystal Urea • "Hypalon" Synthetic Resins • "Lorol" Fatty Alcohols • Nylon-Type 8 • "Opalwax" Synthetic Wax • 3,5,5-Trimethylhexanol

TEXTILES Adipic Acid • "Alathon" Polythene Resins • "Arboneeld" Urea-Formaldehyde Compositions • Du Pont Crystal Urea • Hydroxyacetic Acid • "Hypalon" Synthetic Resins • "Lorol" Fatty Alcohols • Methanol • "National" Aqua Ammonia • Nylon-Type 8 • "Tyze" Resin Textile Size

WOOD "Arboneeld" Urea-Formaldehyde Compositions • Du Pont Crystal Urea

**This is only a partial listing of the Polychemicals Department products which have applications in the industries shown here.*

AND MORE THAN 100 INDUSTRIAL CHEMICALS AND PLASTICS

TECHNICAL BULLETINS AVAILABLE NOW on All Chemicals Listed Here for the Many Industrial Fields Served by the Polychemicals Department

It is quite possible that many of your questions about Du Pont 3,5,5-Trimethylhexanol and other Polychemicals' products are answered in technical data available. Or your Du Pont Polychemicals representative can help you get the answers. You can contact him through your nearest district office—350 Fifth Avenue, New York 1, N. Y.; 818 Olive Street, St. Louis 1, Missouri; 7 S. Dearborn Street, Chicago 3, Illinois; 140 Federal Street, Boston 10, Mass.; 845 E. 60th St., Los Angeles 1, Calif. For technical bulletins, write your nearest district office.

Department E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DELAWARE

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SILICONE
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Longer Life to Critical Materials Under Stress Conditions.

Superior Lubricants that withstand far higher and lower temperatures than heretofore.

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WAtkins 4-8800

SPECIALTIES NEWS

New Pennsalt Plant Starts Laundry Sours Production

A new plant for the manufacture of improved Erusto Sours and other laundry products has gone into production at the Calvert City (Ky.) Works of the Pennsylvania Salt Manufacturing Co. Capacity is nearly double Pennsalt's former production of Erusto products.

Pennsalt's new plant at Calvert City, Ky., for manufacture of improved laundry sours and other laundry products.

The new plant is the first completed in a series of planned extensions to Pennsalt's basic hydrofluoric and sulfuric acid plants, which went into operation just a year ago. The new unit was built at a cost of approximately $250,000.

In addition to improving the product, Pennsalt also has adopted a Leverpack drum lined with a special polyethylene plastic bag for its container.

The processing unit is constructed entirely of alloy steel and rubber lined equipment. The building is of conventional brick, steel and transite construction. The production equipment and building were designed by Pennsalt's Central Engineering Department. Preliminary work on construction began last November.

Sharp & Dohme to Build Blood Plasma Facilities

To assist in meeting emergency medical requirements, Sharp & Dohme, Inc., has entered into a contract with the Armed Services Medical Procurement Agency to construct additional blood plasma processing facilities. Accordingly the company will erect a suitable structure at West Point, Pa., to process blood plasma. Sharp & Dohme's lyophilization process makes it possible to use plasma stored for as long as five years.

The company will build the structure and the army will provide the equipment. The new plant is in addition to current construction on Sharp & Dohme's West Point property.

Detergent Plant Nears Completion

Scheduled to be in operation by summer's end is U.S. Industrial Chemical's new Baltimore unit, which will produce a liquid detergent, tradenamed Sipon L-20. The lauryl sulfate product is designed for use where mild action on skin, with high foam and detergency, is needed; and is an ingredient of cosmetic products such as shampoos.

Sipon L-20 is the first surface active agent U.S.I. is producing as the result of a detergent development sponsored by the company and Societe Sinova of Paris.

"What's New" Memo

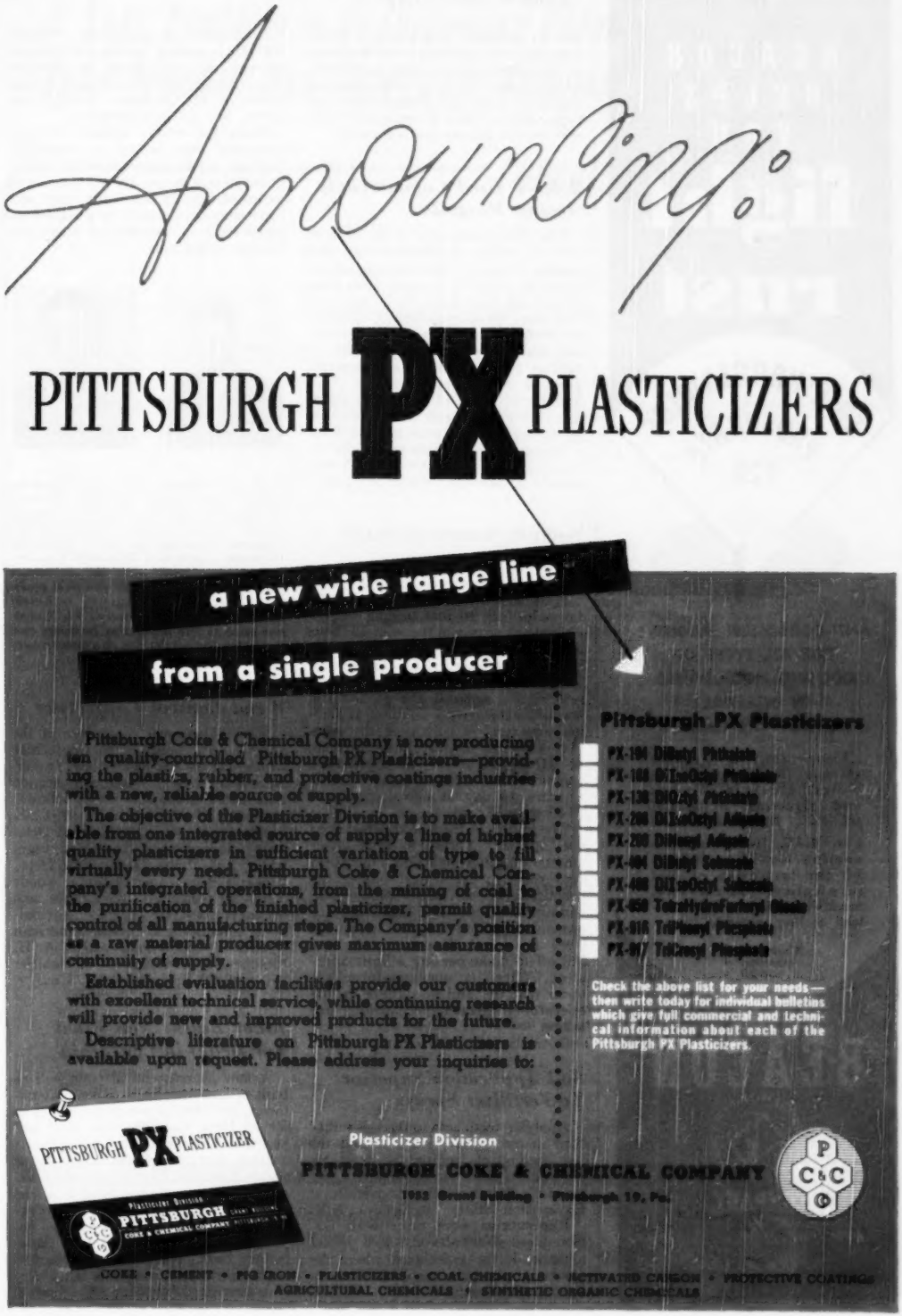
Do you make hair shampoos or aerosols? Warp sizes? Chemicals that go into food products? A whole line of specialties?

You'll find information of value in the following articles in this issue:

"Canned Suds," p. 378.
"Resin-Clad Warps," p. 379.
"Back to Nature," p. 383.
"Quakers' Gamble," p. 385.

TOTA Procedure Revised

The Tentative N.A.I.D.M. Aerosol Test Method for Flying Insects has been modified in respect to dosage. Section III, B now reads "a total of 3.0 grams ± 0.5 grams of aerosol mixture per 1000 cubic feet shall be applied in a continuous flow." The Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, has concluded that reduction from 4.0 grams to 3.0 grams results in a more satisfactory basis for eliminating aerosol formulas that may not be up to standard, and the aerosol industry has concurred in the Bureau's action. The Bureau's Dr. S. A. Rohwer has advised that aerosol formulas not meeting the standard (Tentative Official Test Aerosol) on knockdown and mortality at the 3 gram dosage will not be accepted under terms of license. He had pointed out that in evaluating aerosol formulas for acceptance, the


Announcing:
PITTSBURGH PX PLASTICIZERS
a new wide range line
from a single producer
Pittsburgh Coke & Chemical Company is now producing ten quality-controlled Pittsburgh PX Plasticizers—providing the plastics, rubber, and protective coatings industries with a new, reliable source of supply.
The objective of the Plasticizer Division is to make available from one integrated source of supply a line of highest quality plasticizers in sufficient variation of type to fill virtually every need. Pittsburgh Coke & Chemical Company's integrated operations, from the mining of coal to the purification of the finished plasticizer, permit quality control of all manufacturing steps. The Company's position as a raw material producer gives maximum assurance of continuity of supply.
Established evaluation facilities provide our customers with excellent technical service, while continuing research will provide new and improved products for the future.
Descriptive literature on Pittsburgh PX Plasticizers is available upon request. Please address your inquiries to:
Pittsburgh PX Plasticizers
PX-194 DiButyl Phthalate
PX-138 DiOctyl Phthalate
PX-206 DiIsoOctyl Adipate
PX-200 DiHexyl Adipate
PX-404 DiButyl Sebacate
PX-850 TetraHydroFurfuryl Oleate
PX-810 TriPhenyl Phosphate
PX-917 TriCresyl Phosphate
Check the above list for your needs—then write today for individual bulletins which give full commercial and technical information about each of the Pittsburgh PX Plasticizers.
PITTSBURGH PX PLASTICIZER
Plasticizer Division
PITTSBURGH COKE & CHEMICAL COMPANY
Plasticizer Division
PITTSBURGH COKE & CHEMICAL COMPANY
1952 Grant Building • Pittsburgh 19, Pa.
COKE • CEMENT • PIG IRON • PLASTICIZERS • COAL CHEMICALS • ACTIVATED CARBON • PROTECTIVE COATINGS
AGRICULTURAL CHEMICALS • SYNTHETIC ORGANIC CHEMICALS

BEACON HELPS YOU fight rust

TRIETHANOLAMINE PHOSPHATE 728

ANTI-CORROSION ADDITIVE FOR ALL TYPES OF COOLING LIQUIDS USED IN INTERNAL COMBUSTION ENGINES

Characteristics: A yellow viscous liquid soluble in water, alcohols, glycols and glycerine. Sp.G. 1.30 pH (10% Aq. Soln.) 7.9-8.3

Use: 2.5% in a suitable cooling liquid will inhibit the formation of rust in airplane, automobile, marine engines and industrial cooling systems.

Write today for experimental sample

THE BEACON COMPANY

PURITY · UNIFORMITY · DEPENDABILITY

Chemical Manufacturers

97 BICKFORD STREET
BOSTON 30, MASSACHUSETTS

Bureau considers particle size, active toxicants, ratio of solvent and toxicants to propellants and possible health hazards. It will be up to each company concerned to produce performance data supporting any new formulation it submits to the Bureau for approval.

2,4,5-T Used Commercially Against Mesquite

The first commercial application of 2, 4, 5 - trichlorophenoxyacetic acid against mesquite was carried out recently by airplane spraying 1600 acres of a ranch near Spur, Tex. Mesquite is a spiny shrub considered a nuisance by cattlemen since it conceals cattle and makes them man-shy; makes it difficult to drive them; and deprives grass of moisture and nutrients. This initial application of 2,4,5-T to eliminate the pest growth, to be followed by others shortly, was the result of a three-year field study under the direction of C. E. Fisher of the Texas A & M Experiment Station at Spur.

Sodium Arsenate Debarks Trees

A practical method of using chemicals to debark trees that are to be cut for pulpwood, so that peeling is possible at any season of the year, has been developed by the Armstrong Forestry Co., Johnsonburg, Pa. During the spring when the sap is rising, the trees selected for removal are girdled and brushed with a weak solution of sodium arsenate. A gallon of the solution is enough to treat 30 to 50 cords, or 300 to 500 trees. An experienced operator can girdle and treat 20 cords or more per day, at a total cost of 40 to 60 cents a cord.

The killing of the tree depends upon the species. Three months after treatment, pines, oak and aspen peel very readily; beech and maple take practically a year. After proper seasoning, the tops and branches dry out so that they shatter when the trees are felled. Enough bark may fall off to make peeling a light operation. There is no harmful effect upon wildlife, and no danger to the operator if proper precautions are taken.

Soil Application Superior To Fertilizer Sprays

Applying fertilizers to the soil rather than in nutritional sprays is still the best method of feeding the vegetable canning crops, in the opinion of workers at the New York State Agricultural Experiment Station at Geneva, N.Y.

Experiments were made with Detroit Dark Red beets and Red Jacket tomatoes in the greenhouse where the amount of nitrogren supplied the plants in soil and solutions and in foliage sprays could be accurately checked. All plants getting additional nitrogen through the roots were far superior in size, color, and set of fruit to those receiving the fertilizer through the leaves, say the experimenters.

From the results obtained it was concluded that so far as vegetable canning crops are concerned, nutritional foilage sprays are a less efficient means of feeding these crops than soil treatments, and should be regarded as useful only in overcoming acute deficiency symptoms.

Robert H. Steiner (left), appointed research coordinator of Atlas Mineral Products Co., and F. B. Havens, named Pacific Coast regional manager of the Pigment Department, Calco Chemical Division, American Cyanmid Co. Dr. Steiner has been with the Firestone Tire and Rubber Co. for the past seven years. Mr. Havens, formerly technical field service representative for Calco, has been in the protective coatings and dry color industries for the past twenty years.

Weed Control Conference

The 1951 annual conference of the Northeastern Weed Control Conference will be held at the Hotel New Yorker, New York City, on Jan. 3-5. Section chairman and subjects are as follows: agronomy: field crops and turf, C. E. Phillips, Agronomy Dept., U. of Delaware; horticulture: fruits and vegetables, J. R. Havis, Horticulture Dept., Virginia Polytechnic Institute; woody plants: ornamentals, floriculture and brush control, T. R. Cox, Agricultural Chemicals Division, American Cyanamid Co.; public health, A. H. Fletcher, N. J. State Dept. of Health; and general subjects, T. R. Cox.

Riker Builds New Plant For Drugs in California

A new pharmaceutical plant will be built in Los Angeles by Riker Laboratories, Inc., wholly owned subsidiary of Rexall Drug Co. The new plant will produce Veriloid, a purified and standardized extract derived from Veratrum viride, used in treatment of hypertension. The crude botanical drug has long been known to be useful in reducing high blood pressure but has not previously been available in a satisfactory form. The plant is expected to begin operation during this fall.

Arthur D. Little, Inc., Cambridge.

If Your Problem is to Introduce Chlorine Into Organic and Inorganic Compounds,

Consult HOOKER

As inventors of the famous Hooker "S" Cell for the production of high quality Chlorine, it is natural for Hooker to specialize in the manufacture of Chlorine compounds. In addition to liquid chlorine, there are several other chlorinating agents manufactured by Hooker. For various types of organic and inorganic chlorinations you may select the one best suited to your processing requirements. Their uniformity and high quality enable the user to prepare products of uniformly high quality without costly variations in manufacturing procedure.

In addition, the experience of Hooker's technical staff is available to you for consultation on any processing or handling problems.

THIONYL CHLORIDE • $SOCl_2$

Since Thionyl Chloride has been commercially available in a high degree of purity, it has become of increasing importance to the synthetic organic chemical industry. It reacts with the hydroxy group usually replacing it with an atom of chlorine. It reacts with the organic acids to produce acid chlorides or anhydrides. By the use of high vacuum during distillation good results are obtained in the production of the acid chloride of stearic acid and other high molecular weight fatty acids.

Thionyl Chloride may also be used to introduce sulfur alone or in combination with oxygen.

For technical data on Thionyl Chloride, write on your company letterhead for Hooker Data Sheet No. 718.

Molecular Wt.	119
Description	Pale yellow to red liquid
Freezing Pt.	Below—75°C
Boiling Range	Technical grade 72° to 79°C Refined grade 75° to 78°C
Spec. Grav. at 15.5°C	1.640
Analysis	Technical grade 93.0% by wt. $SOCl_2$ Refined grade 97.5% by wt. $SOCl_2$

SULFURYL CHLORIDE • SO_2Cl_2

Sulfuryl Chloride is an inorganic compound most useful in the synthesis of organic chemicals. As a chlorinating agent Sulfuryl Chloride has the advantage of reducing substantially the heat of chlorination over that of using elementary chlorine. Furthermore it is possible by using different catalysts, reacting at different temperatures and by carefully controlling proportions to chlorinate selectively.

Five types of reactions of Sulfuryl Chloride with organic compounds are of importance: (1) chlorination of aromatic compounds; (2) chlorination of aliphatic compounds; (3) sulfonation of aliphatic compounds; (4) acylation (preparation of esters, acid chlorides, anhydrides, etc.); (5) condensation and miscellaneous reactions.

For technical data on Sulfuryl Chloride write on your company letterhead for Hooker Data Sheet No. 717.

Molecular Wt.	135
Description	Light yellow liquid
Freezing Pt.	Below —54°C
Boiling Range	2° including 69.5°C
Spec. Gravity at 15.5°C	1.680
Analysis	Over 99% by wt. SO_2Cl_2

SULFUR CHLORIDES • Mono—S_2Cl_2 Di—SCl_2

Sulfur Monochloride and Dichloride are so closely related that their uses should be considered together. Sulfur Monochloride is a definite chemical compound with well defined properties, but the Dichloride may be considered as the equivalent of chlorine dissolved in S_2Cl_2.

The sulfur chlorides react with unsaturated hydrocarbons introducing sulfur and chlorine into the molecule. In addition there are a substantial number of reactions for which the chlorides are definitely indicated as a ready source of chlorine because of their advantages of handling, of storage and low price.

For technical data on Sulfur Dichloride, write on your company letterhead for Hooker Data Sheet No. 759. For data on Sulfur Monochloride request Data Sheet No. 760.

	Sulfur Dichloride SCl_2	Sulfur Monochloride S_2Cl_2
Mol. Wt.	103	135
Description	Dark brown or reddish liquid	Yellow to slightly reddish liquid
Freezing Pt.	−78°C	−80°C
Boiling Pt.	Decomposes above 40°C	138°C
Spec. Gravity at 15.5°C	1.638	1.6885
Analysis by wt.	66% Cl_2	52 to 52.5% Cl_2

For more detailed information write us on your firm letterhead. We will send you Technical Bulletin 328A "Chlorinating Agents," which describe these and other Hooker chemicals for chlorinating.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

3 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

HOOKER CHEMICALS

10-978

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM BENZOATE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

Mass., which cooperated with Riker Laboratories in the pilot plant stage of the development of the process has contracted to design and construct the plant for the drug company. The design has been drawn up, and A. D. Little is now procuring equipment, and will supervise construction and installation and start up the commercial plant.

Carbonyl Iron Powder Wins Approval for Medical Use

Carbonyl Iron Powder, a form of metallic iron of extreme purity and microscopic particle size, has been approved for medical use by the Committee on National Formulary of the American Pharmaceutical Association. It will be put into limited distribution for manufacturing use by Antara Products, General Aniline & Film Corp., under the label of G A & F Carbonyl Iron Powder RX.

The powder is made by the reaction of carbon monoxide gas on iron ores to form liquid iron pentacarbonyl. The liquid is then vaporized and the heated vapor decomposes into iron powder in the form of microscopic spheres, which remain stable, with no change in form or color.

Approval by the A.P.A. followed tests on animals at the Industrial Toxicology Laboratories of Philadelphia.

Carbonyl Iron Powder has been produced in this country since 1941 at the plants of the General Aniline & Film Corp. at Grasselli, N.J., and at Huntsville, Ala. Reduced iron is commonly added, in enriching bread and other foods, along with vitamins, thiamin, etc., and is a standard ingredient in pills combining minerals and vitamins.

CHLOROFORM
★ U. S. P.
★ Technical
Chemical Division
McKESSON & ROBBINS INC.
155 EAST 44th ST. • NEW YORK 17, N. Y.
★ Offices in All Principal Cities ★

Paint and Resin Courses

Three of the five courses comprising the series in paint and resin technology which have been given by the Polytechnic Institute of Brooklyn, N.Y., will be offered in 1950-51, when the fall semester opens Sept. 25. This year's courses will be "Oil, Resin and Varnish Technology," "Paint and Pigment Technology," and "Technology of Resins and Plastics."

Henry F. Payne, of American Cyanamid Co., will give the first two, and the resin and plastics course will be given by Paul F. Bruins and a group of lecturers. The courses will be open to adult students who are qualified to profit by the instructions, as well as graduate students.

Fabric Serviceability Bibliography

Serviceability of fabrics is the subject of a technical bibliography released through the Office of Technical Services of the U.S. Dept. of Commerce. Prepared by the Philadelphia Quartermaster Corps Technical Library, it provides descriptive references on 168 studies in field deterioration tests and laboratory tests of wear and abrasion. Materials included cover the period 1936-1949.

PB 110 281, The Serviceability of Fabrics, 54 pp., sells for $1.50. Orders should be addressed to the Office of Technical Services, U.S. Dept. of Commerce, Wash. 25, D.C.

Bibliography on Detergents

Dishwashing detergents and dishwashing machines are the subject of a new technical bibliography released through the Office of Technical Services of the U.S. Department of Commerce. The bibliography, prepared by the Philadelphia Quartermaster Corps Technical Library, provides descriptive references on sixty-six representative patents in these fields, issued during the years 1932-1948.

PB 99428, *A Patent Survey on Dishwashing Detergents and Dishwashing Machines*, 20 pages, sells for 50¢. Orders should be addressed to the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

Brake Fluid Bulletin

Celanese Corp. of America, 180

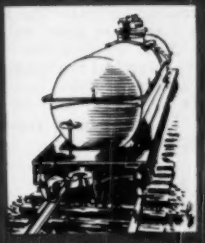
FUMIGANTS

Stauffer CHEMICALS SINCE 1888

SOLVENTS

FLOTATION AGENTS

HERBICIDES



RAYON

Carbon Bisulphide

99.99% Pure

RUBBER ACCELERATORS

QUALITY IN QUANTITY

FUNGICIDES

INSECTICIDES

WITH six plants producing Carbon Bisulphide strategically located throughout the country, Stauffer is geared to serve the Chemical Process Industry with drum or tank car shipments of Technical Grade Carbon Bisulphide — 99.99% Pure. Carbon Bisulphide is one of the many industrial chemicals manufactured by Stauffer and listed in its comprehensive 106-page catalog. Write or phone for your copy today.

Packing
(Non-Returnable, ICC-17C, Steel Drums)

Size	Net Wt.	Gross Wt.	Height	Diam.
55 gallon	550 lbs.	612 lbs.	35½"	24"
10 gallon	100 lbs.	116 lbs.	17½"	14½"
5 gallon	50 lbs.	61 lbs.	10½"	14½"

Tank Cars: 8,000 and 10,000 Gallons

OTHER STAUFFER PRODUCTS

BHC (Benzene Hexachloride)
Borax
Boric Acid
Boron Trichloride
Carbon Tetrachloride
Caustic Soda
Chlordane
Chlorine
Citric Acid
DDT (Dichloro Diphenyl Trichloroethane
Ethylene Trithiocarbonate
Silicon Tetrachloride
Sodium Hydrosulphide
Sulphur Chloride
Sulphur—Soluble
(Specially processed for all industrial & agricultural uses)
Sulphur—Insoluble
(For rubber compounding and other uses)
Sulphuric Acid
Tartaric Acid
Textile Stripper
Titanium Tetrachloride
Toxaphene (Chlorinated Camphene)
2,4-D (Acid, Isopropyl Ester Amine Salts)

Stauffer

CHEMICAL COMPANY

420 Lexington Avenue, New York 17, N. Y. • 221 North LaSalle Street, Chicago 1, Illinois • 824 Wilshire Blvd., Los Angeles 14, California • 636 California Street, San Francisco 8, California • 424 Ohio Bldg., Akron 8, Ohio • Apopka, Florida • North Portland, Oregon • Houston 2, Texas • Weslaco, Texas

Madison Ave., New York 16, is offering a new bulletin, E-2, which gives concise information on brake fluid formulation. Its four pages cover an explanation of SAE specifications and critical data on 20 typical formulations, and, states Celanese, show how to reduce costs by use of two of its chemicals. It is available on request to the company.

Pennsalt to Increase BHC Production

The Pennsylvania Salt Manufacturing Co. is expanding production of its benzene hexachloride by approximately 45 percent at its plant at Natrona, near Pittsburgh. Work on the new facilities has been started, and the increased production will be available by the end of this year.

The company has also made appropriations slightly in excess of $1 million for other expansion and improvements to existing facilities at Pennsalt plants in Wyandotte, Mich., Calvert City, Ky., and Natrona and Cornwells Heights, Pa.

Company Notes

• **Kraft Chemical Co.,** Chicago, regrets that its previous announcement regarding its representing better Finishes & Coatings, Inc. was ambiguous. Kraft is not stocking paints and plastics for Better Finishes & Coatings, but represents the company only for distribution of its plating grade chromic acid flake.

• **Fine Organics, Inc.,** is entering the industrial and motor fleet market. To do this, the Aviation Chemicals Division has been broadened in scope and has become the Aviation-Industrial Division. It will continue under the direction of John B. Moore, who has been appointed general sales manager of aviation and industrial chemical sales. Arthur K. Meyer Co., Los Angeles, Cal., will represent the company in Los Angeles county. Charles H. Cadiz, formerly superintendent of maintenance of TACA Airways, has joined the company as southern sales representative for both lines.

• **Construction has started** on a building to house the New Orleans Branch of Sharp & Dohme, Inc. Providing greater space and more modern facilities for the company's expanding business in that area, it will replace the present New Orleans office and warehouse facilities.

• **Graver Water Conditioning Co.,** manufacturers of equipment for water-treating processes, has appointed James T. Potter as its representative for the states of North and South Carolina. Mr. Potter's headquarters are at 1521 Stanford Place, Charlotte, North Carolina, from where he will provide engineering and sales service on water softeners, filters, and other equipment for the removal of impurities from water.

• The David E. Long Corp., 220 E. 42 St., New York 17, has recently been formed by David E. Long who has recently severed connections with Prufcoat Sales Co. and Prufcoat Laboratories Inc. Using the trade mark, Del Protective Coatings, the company will make and sell corrosion-abating materials and systems.

• **The Carboline Co. of St. Louis** has appointed R. A. Dittbrenner as its eastern representative. In addition to being eastern representative, Mr. Dittbrenner will handle the advertising and sales promotion for Carboline on its line of thermosetting and thermoplastic coatings and linings.

CROSBY

THE MARK OF QUALITY

Crosby Chemicals, Inc., with two large modern plants in full production and with an abundant supply of raw materials can take care of your requirements of—

STEAM DISTILLED WOOD TURPENTINE
TERPENE HYDROCARBON SOLVENTS
HEAT TREATED WOOD ROSINS
NAVAL STORES SPECIALTIES
PAPER SIZE, ALL GRADES
MALEIC MODIFIED ESTERS
RESINOUS CORE BINDERS
METALLIC RESINATES
LIMED WOOD ROSINS
PALE WOOD ROSINS
BEREZ WOOD RESIN
RESIN SOLUTIONS
P. E. ESTER GUM
TERPIN HYDRATE
FF WOOD ROSIN
ROSIN RESIDUE
ALPHA PINENE
BETA PINENE
GLOSS OILS
ESTER GUMS
TERPINEOLS
PINE OILS
DIPENTENE
CAMPHENE
ANETHOLE

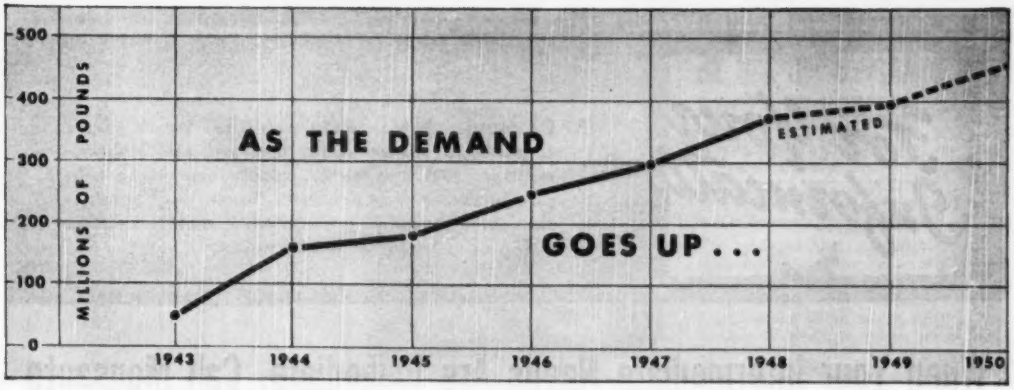
All pale rosins and resins available in new type, light tare, scrap value, aluminum drums.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

CROSBY CHEMICALS, INC.

DE RIDDER, LOUISIANA

Plants: Picayune, Miss., and De Ridder, La.



ANTARA® announces new low prices on NON-IONIC SURFACTANTS

Antarox A-200, A-201, A-400, A-401, A-402, A-403, A-404, A-480

Alkyl aryl polyoxy ethylene glycols

. . . in a complete series with varying properties and degrees of water-solubility—and from clear liquids to pastes and waxes

Steadily the demand increases—as industry after industry finds new and wider uses for surfactants. This young industry has already surpassed synthetic rubber in its tonnage!

The *non-ionic* surfactants are in particular demand by the makers of cleansers of every type—for the home, commerce and industry—insecticides, cosmetics, metal cleaning compounds, oils, waxes and other products.

In keeping with this trend, Antara announces new low prices—reductions of 13% to 15%—on the A-200 and A-400 Series of non-ionic surfactants. Such reductions mean that these superior agents are now priced for use by many additional compounders.

We invite your inquiry for Data Sheets and the new prices. Extensive research staffs and facilities support the development and application of all Antara Surfactants—available to work with you in the improvement of an existing product or the development of a new one. Your inquiry is invited —without obligation. It will bring a prompt opinion as to whether one of the Antara Surfactants may be adaptable to your needs. Kindly address your inquiry to Department 45.

APPLICATIONS

Detergents	Foamers
Emulsifiers	Anti-static agents for polystyrene plastics
Wetting Agents	
Dispersants	
Penetrants	Solubilizers

ANTARA® PRODUCTS

SURFACTANTS . . . CARBONYL IRON POWDERS

GENERAL ANILINE & FILM CORPORATION

444 MADISON AVENUE, NEW YORK 22, NEW YORK

1639 POPLAR STREET, OAKLAND 7, CALIFORNIA

In Canada: CHEMICAL DEVELOPMENTS OF CANADA LIMITED, LEASIDE, TORONTO 17

When Your Intermediate Needs Are Immediate, Call Monsanto

Strategically located district sales offices, warehouses and chemical plants are the facilities which Monsanto has to serve industry with more than two-score intermediates. In addition to its extensive line of intermediates, Monsanto is able to produce *special* chemicals for industries with special needs.

Monsanto's physical facilities offer you prompt service at favorable prices and low transportation costs. More important to you is traditional Monsanto *quality*, characteristic of all Monsanto intermediates. This quality is your assurance of uniform intermediates that can be counted upon to deliver excellent results in your plant.

Next time you have immediate need for intermediates, get in touch with the nearest Monsanto Sales Office, or write to Monsanto headquarters in St. Louis. Seven Monsanto Intermediates are described on these pages.

A Few of Many Monsanto Intermediates

CYCLOHEXYLAMINE

Molecular Weight: 99.17

Formula:

Properties: Clear, practically colorless liquid. Specific Gravity—0.870–0.874 at 15.5°/15.5° C. Distillation Range—First drop 132.0° C. min.; 95% (1-96 ml) 4.0° C. max.; dry point 137.5° C. max.

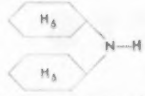
Reactions: A strong base which forms salts with all acids including CO_2 from the air. Forms soaps with long chain fatty acids. One or both hydrogens attached to the nitrogen may be replaced by alkyl, aralkyl, aryl or alkylol groups. Reacts with CS_2 to form a dithiocarbamate and condenses with aldehydes. Reacts with 2,2'-dichloroethyl ether to form N-cyclohexylmorpholine.

Uses: Dyestuff intermediate, petroleum additive, component in boiler water treatment, corrosion inhibitors, organic synthesis.

DICYCLOHEXYLAMINE

Molecular Weight: 181.31

Formula:



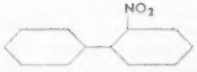
Properties: Clear, practically colorless liquid. Specific Gravity—0.913-0.919 at 15.5°/15.5° C. Distillation Range—First drop 352.0° C. min.; 95% (1-96 ml) 4.0° C. max.; dry point 258° C. max.

Reactions: A strong base which forms salts with all acids. Forms soaps with long chain fatty acids. The hydrogen attached to the nitrogen may be replaced by an alkyl, aralkyl, aryl or alkylol group. Forms crystalline hydrates and alcoholates at low temperatures.

Uses: An intermediate in the manufacture of oil additives and insecticides.

ortho-NITROBIPHENYL
(ortho-Nitrodiphenyl)

Formula: **Mol. Wt.:** 199.20



Properties: Yellow-to-reddish crystalline solid or oily liquid. Crystallizing Point—34.5° C. Boiling Point—About 325° C. Flash Point—290° F. Specific Gravity at 25°/25° C.—1.20.

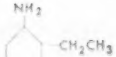
Reactions: Can be reduced to ortho-aminobiphenyl or intermediate reduction products. Can be further nitrated or halogenated with the entering group going predominantly into the unsubstituted ring.

Suggested Uses: As a plasticizer for a variety of resins and plastics. It is compatible with the cellulose esters and ethers, polyvinyl chloride, polyvinyl chloride copolymers, polyvinyl formal and butyral, polyvinyl acetate, polystyrene, rosin, rosin esters, modified phenolic resins, oil soluble phenolic resins, alkyd resins and vegetable oils.

As an intermediate in the manufacture of dyestuffs and other products.

ortho-ETHYLANILINE
(ortho-Aminoethylbenzene)

Formula: **Mol. Wt.:** 121.18



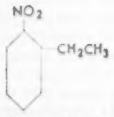
Properties: Colorless liquid, darkens on standing. Boiling Point—about 215° C. Specific Gravity at 25°/25° C.—0.98. Miscible with alcohol and benzene, slightly miscible with water.

Reactions: Undergoes typical reactions of aromatic amines such as acylation, alkylation and diazotization. Condenses with aldehydes and reacts with CS_2 to give substituted thioureas.

Suggested Uses: As an intermediate in the manufacture of azo dyes, pharmaceuticals, rubber chemicals and other products.

ortho-ETHYLNITROBENZENE

Formula: **Mol. Wt.:** 151.16



Properties: Clear, yellow-to-green liquid. Boiling Point about 228° C. Specific Gravity at 25°/25° C.—1.1. Crystallizing point about minus 13° C.

Reactions: Can be reduced to ortho-ethylaniline and other intermediate products. The side chain can be oxidized to give ortho-nitrobenzoic acid.

Suggested Uses: As an intermediate in the preparation of dyestuffs, pharmaceuticals and other products.

meta-CHLOROANILINE

Formula: **Mol. Wt.:** 127.57

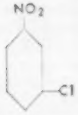
Properties: Clear light-yellow liquid. Assay—99% min. Crystallizing Point—minus 10.6° C. min. Distillation Range—228° C. start, 231° C. dry point, 95% within 1.0° C.

Reactions: Undergoes typical reactions of aromatic amines such as diazotization, acylation and alkylation. Reacts with CS_2 to give substituted thioureas and condenses with aldehydes.

Suggested Uses: As an intermediate in the manufacture of azo dyes and pharmaceuticals.

meta-CHLORONITROBENZENE
(meta-Nitrochlorobenzene)

Formula: **Mol. Wt.:** 157.56



Properties: Greenish-yellow crystalline mass. Crystallizing Point—43.9° C. min.

Reactions: Can be reduced to meta-chloroaniline and other intermediate products.

Can be further chlorinated, nitrated or sulfonated.

Suggested Uses: As an intermediate in the preparation of dyestuffs and pharmaceuticals.

PLASTICS COSTS CUT BY USE OF LOW-PRICED HB-40

Monsanto's improved HB-40 (partially hydrogenated terphenyl) is an avenue for reducing costs while maintaining quality in vinyls, polystyrene dispersions and casting resins. HB-40 is unusually low in price.

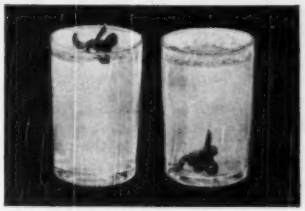
Improved HB-40 is practically water-white, making its use possible in plastics that are brightly colored or clear. Properly stabilized clear and tinted vinyls, in which HB-40 serves as an extender plasticizer, have good light and heat stability.

HB-40 is economical in two ways. First, it is attractively low in price on a pound basis. Second, it is low in price on a pound volume basis since its specific gravity is 1.004.

HB-40 is relatively nonmigratory and is regarded very low in toxicity. In many vinyl formulations it can be used as an extender for higher-priced primary plasticizers to the amount of 25 per cent of the total weight of plasticizers. In many polystyrene dispersions it is the only plasticizer required.

For further information on Monsanto's HB-40, mail the coupon.

SANTOMERSE No. 1 SOLVES MANY TOUGH DETERGENCY PROBLEMS



SANTOMERSE No. 1 is a rapid wetter. The photo above shows woolen yarn floating on water. Within seconds after a small amount of Santomerse No. 1 was added, the yarn was wet through and through and sank.

If you have a tough problem of detergency, emulsifying or wetting out, investigate the possibilities of Monsanto's Santomerse* No. 1.

Santomerse No. 1 is the all-purpose detergent and wetting agent. It is effective in acid, neutral and alkaline solutions . . . in hard or soft water. Santomerse No. 1 does a thorough job in hot or cold solutions. Because of its efficiency in hard water, Santomerse No. 1 prevents the formation of insoluble curds which are detrimental in some industries.

Santomerse No. 1 is an alkyl aryl sulfonate compound having a minimum of 40% active ingredient. It is unexcelled by any similar detergent-wetting agent.

For further information on Santomerse No. 1, contact the nearest Monsanto Sales Office or mail the coupon.

LOWER PRICES ON STEROX SE, SK, 5 and 6 SURFACE ACTIVE AGENTS

Prices on four of Monsanto's non-ionic surface active agents have been reduced from 3 to 5 cents a pound. These products, Sterox* SE, SK, 5 and 6, also are good emulsifiers and detergents. Mail the coupon for details.

PAINTS ARE IMPROVED BY USE OF MONSANTO'S FAMILY OF AROCLORS

Whether you are a user or a manufacturer of maintenance paints, the Monsanto AROCLOR* family is important to you. It is important because of the extra qualities it puts into paints.

The qualities that the AROCLORS (chlorinated biphenyl and chlorinated polyphenyls) put into protective coatings mean *protection*. They give paints greater toughness and adhesion . . . stronger resistance to corrosion, flame, water and weather . . . greater resistance to acids and alkalies. The AROCLORS have good electrical properties.

If you are a user of maintenance paints, you will like the long-lasting qualities of coatings containing AROCLORS. It is possible that such paints will reduce your maintenance costs.

If you manufacture paints, it will be worth your while to look into what the AROCLORS have to offer. There's a series of AROCLORS, both liquids and resins, having a great variety of properties. For data on AROCLORS, mail the coupon.

FREE!

If you use phosphoric acid, mail the coupon for your *free* copy of "The handling of 75% phosphoric acid in tank car quantities."

MONSANTO CHEMICAL COMPANY, 1703-J South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS—PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

INFORMATION: ☐ Cyclohexylamine. ☐ Dicyclohexylamine. ☐ ortho-Nitrobiphenyl. ☐ AROCLORS. ☐ HB-40. ☐ Sterox. ☐ Santomerse No. 1.

LITERATURE: ☐ Phosphoric Acid.

SAMPLES: ☐ ortho-Ethylaniline. ☐ ortho-Ethylnitrobenzene. ☐ meta-Chloroaniline. ☐ meta-Chloronitrobenzene.

MONSANTO CHEMICAL COMPANY
1703-J South Second Street
St. Louis 4, Missouri

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Company.....

Street.....

City.....Zone....State.....

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Trade Mark

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is made especially for

- **TANNING**
  For the removal of insoluble calcium salts during tanning to produce a tear resistant flexible leather. For neutralizing pickled skins in chrome tanning to give amazingly short tanning periods.
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  For the preparation of diazo compounds in developing azo colors.
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  For dry fixer and hardening powders.
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  Used as an acid absorbent in the manufacture of Neoprene Crepe. For activating rubber accelerators.

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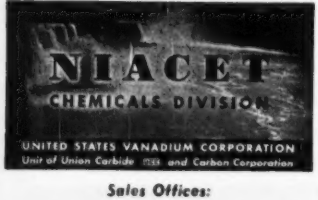


Sales Offices:
922 Niagara Bldg. • Niagara Falls, N. Y.

NEW CHEMICAL SPECIALTIES

Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Products and Processes department.

Paint Remover

Compound is fast-acting, saves on labor.

Liquid Sandpaper, as the name implies, is designed to replace sanding of surfaces preparatory to refinishing. The chemical compound, manufactured by General Liquids Corp., 129 E. Baltimore St., Baltimore, is described as excellent for removing wax, grease and polish from hardwood floors, painted and enameled surfaces, and for removing deeply imbedded dirt and grime, with no after rinse required. Using Liquid Sandpaper is supposed to eliminate need for sanding painted wood, metal and plaster surfaces, before refinishing, and to dull the gloss and thus provide a flat undercoat.

National distribution is handled by the manufacturer. Packed in pint, quart and gallon cans, it is available through department and retail stores. Hotels, steamships, and other quantity-users can obtain Liquid Sandpaper in bulk.

Floor Finish

Finish protects floors in gyms and other hard-use areas.

Plastic Products, Ottawa, Ohio, has developed an abrasion-resistant, durable floor finish for gymnasiums, handball courts and other recreational rooms. The new finish, named Lino-Plastic, was tested at YMCA's in three Ohio cities and rated "superior to other floor finishes" by physical directors.

Lino-Plastic is a modification of a cellulose coating produced by Monsanto Chemical Co.'s Merrimac Division. Plastic Products claims maintenance is reduced to a minimum, with yearly upkeep confined to spotting in hard-used traffic areas. It is applied by lambswool applicator or brush. It dries quickly, and the transparent surfacing does not change the color of the playing floor, states the company.

Moulding Starch

Minimized dusting cuts fire hazards in candy manufacturing.

Hazards that normally accompany moulding operations in candy manufacturing processes are reported to be considerably reduced with Moulding Starch L, a new starch introduced by National Starch Products Inc., 270 Madison Ave., New York 16.

Developed in co-operation with insurance companies, Moulding Starch L reduces the danger of fire or explosion during moulding operations by minimizing dusting. There is a marked reduction in dusting tendency even when the moisture content of Moulding Starch L is reduced to six or seven per cent after several re-drying cycles. National Starch claims further that Moulding Starch L is capable of rejuvenating old starch stocks that have lost their mouldability. Its characteristics are virtually undisturbed by constant re-heating. The product permits cleaner plant operation, and in addition to the added safety factor, Moulding Starch L provides sharp impressions that resist crumbling and reduce scrap on crippled pieces, states the company.

Cloth Flameproofer

Durable flameproofing treatment that withstands repeated launderings is based on special latices.

A new flameproofing compound for all types of cloth called Permaproof 300 is now being manufactured on a commercial scale by its developer, Treesdale Laboratories & Textile Processing Co., Benedum-Trees Building, Pittsburgh 22, Pa. It is a

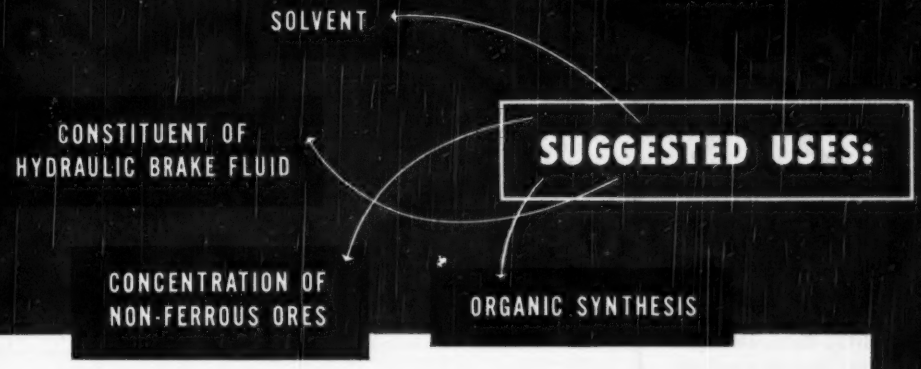
Worker at Jones & Laughlin Steel Corp. puts acetylene torch to cloth treated with new flameproofing material. Although the torch charred fabric, there was no flame or afterglow when it was removed.

combination of special latices manufactured to Treesdale's formulation by and in conjunction with B. F. Goodrich Chemical Co. This liquid dispersion based on Geon latex differs from many conventional flameproofing materials in that it contains no pigment. A patent on the new material is pending.

The material is applied by a one-bath treatment. Cloth to be treated is run through a padder box containing Permaproof 300 diluted with water, and then squeezed and dried in the usual manner. On certain types of cloth it is advisable to give the finished material a rope wash to improve the hand. The treated cloth is claimed not

PENTASOL

SHARPLES SYNTHETIC AMYL ALCOHOLS



PENTASOL consists of five isomeric amyl alcohols. Those which predominate are: 1-pentanol; 3-methyl-1-butanol and 2-methyl-1-butanol. The others which are present are: 2-pentanol and 3-pentanol.

SPECIFICATIONS

Color	Water-white
Specific Gravity @ 20°/20°C	0.81-0.82
Neutralization Value (mg.KOH per g)	Max. 0.06
Water content	None
Distillation:	
Initial boiling point	Min. 112°C
Not more than 5%	Below 118°C
Not more than 50%	Below 125°C
Not more than 85%	Below 130°C
Final Boiling Point	Max. 140°C

Write us regarding special mixtures of isomers or isomers of higher purity.

OTHER PROPERTIES

Average Weight per gallon	6.8 lb.
Flash Point (open cup)	115°F
Refractive Index @ 20°C	1.409
Surface Tension	37.7 dynes/cm.
Viscosity @ 20°C	4.3 centipoises

For prices and samples write to Dept. A.

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC.

PHILADELPHIA NEW YORK CHICAGO

Chemicals with APPEAL

Aromatic Chemicals play an increasingly important role, not only in the field of chemistry and industry but practically in all facets of everyday living. Chemicals impart aesthetic importance and sales appeal. They have become an important adjunct of advertising, promotion and merchandising. Chemicals are utilized to make products look good, smell good, taste good and, quite often, feel good to the touch. Chemicals too, express and reflect the tempo and reality of the day like our literature or our movies or television.

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only to be durably flameproof, but also to be mildew-resistant, have a residual shrinkage not exceeding 4%, and to have improved tensile strength. Fabrics are said to be unaffected in color by the treatment, possess good "hand". Wearing experiences in steel mills have shown Permaproof treated garments to wear at least twice as long as untreated cloth.

Treesdale Laboratories, as the company developing the material was previously known, has been in the fabric treating field since 1932. The work leading to Permaproof began when one of its chemists searching for a new type of mildewproofing accidentally found that one of the ingredients he was working with also had durable flameproofing characteristics. Fabrics treated with Permaproof, which grew out of this discovery, cease to burn as soon as direct flame from an external source is removed since gases formed by decomposition of the ingredients in the compound extinguish the blaze. Jones & Laughlin Steel Corp. has tested Permaproof protective clothing for two years, now furnishes a new flame resistant protective suit to workers on certain hazardous jobs.

Treesdale is now manufacturing the material mainly for its own use, but depending on the general chemical situation, can supply it to outside customers within two weeks after receipt of order. It is sold in drum lots, approximately 65% solids to be diluted with water as required for the type of cloth to be treated.

Buffing and Coloring Composition

Water dispersible composition eases cleaning of buffed and polished metal products.

Hanson-Van Winkle-Munning Co., Matawan, N. J., has developed a water dispersible buffing and coloring composition, designated No. 4-S-10. It is a general-purpose material for color buffing all non-ferrous metals except nickel, says the company. It is easy to clean in aqueous solutions, using a mild alkaline cleaner with or without current. It is supposed to be particularly useful in work with deep filigrees which tend to trap composition into tight, hard masses, ordinarily involving several cleaning operations to provide a presentable product for the consumer.

Steam Cleaning Compound

Heavy-duty compound is easy on cleaning equipment.

Blast, a heavy-duty steam cleaning compound, is a new product of the DuBois Co., Cincinnati 3, O. Incorporating the necessary characteristics for a good steam cleaning material, it is claimed to have excellent detergency, and to give speed and energy needed for fast cleaning of heavily encrusted greasy soils. Other advantages put forth by DuBois are its safety on steam cleaning equipment, and superior water softening and lime and magnesium sequestering ability, so that it will not clog coils.

Blast is odorless, and is recommended for use in all types of steam cleaning equipment.

Tobacco Dust

Insecticide combats hornworm and aphid.

A new tobacco dust aimed to control both the tobacco hornworn and aphid, has been introduced by the agricultural chemicals division of Canadian Industries, Ltd., Montreal.

The insecticide contains 7½% DDT and 1% lindane. Greenhouse tests carried out at the Dominion Entomological Laboratories, Chatham, Ont., showed the mortality rate among aphids of 96% in 46 hours after the new product was applied, compared to 61% when 7½% DDT dust was used alone. While both insecticides kill both pests, DDT is especially effective against hornworms and lindane against aphids. Although the dust has been specially prepared for application by airplane, it is suitable for use in ground dusters.

Oxidizing Liquid

Concentrate is fast-acting on copper, bronze and silver.

H-VW-M Oxidizing Liquid is a concentrated oxidizing liquid offered by the Hanson-Van Winkle-Munning Co., Matawan, N. J. It is claimed to produce oxidation rapidly and with better results than ordinarily obtained with chemicals such as sulphuret, liver of sulphur or their substitutes. An oxidizing solution may be made for copper, bronze and silver by adding ¼ fl. oz. of the concentrate to 1 gal. of water. According to the manufacturer, the solution will not deteriorate, and there is no waste. Solutions may be used hot or cold but faster operation is obtained when hot.

Wheat and Grain Insecticides

Pyrenones protect stored wheat and grains over long periods.

An insecticide treatment for prevention of insect infestation of wheat and other grains in storage which gives full season protection with a single application is promised by U. S. Industrial Chemicals, Inc. The insecticides, Pyrenone Wheat Protectant for all types of wheat, and Pyrenone Grain Protectant for corn, oats, barley, rice and other grains, are mixed with the grain to achieve thorough protection, including the elimination of hidden

For any commercial application requiring a Glassy Sodium Phosphate SPECIFY...

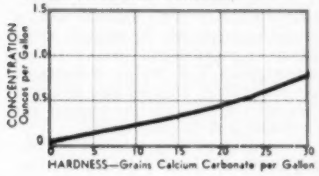
BLOCKSON SODIUM POLYPHOS*

(Sodium Hexametaphosphate)
(Sodium Tetraphosphate)

★ In Sodium Polyphos, Blockson provides a water soluble Glassy Sodium Phosphate of standardized composition in the middle of the glass forming range of Sodium Phosphates . . . for use in all commercial applications where Glassy Sodium Phosphates are indicated. Ground and lump sizes. Mail coupon for bulletin and sample.

EMPIRICAL FORMULA: $Na_{12}P_{10}O_{31}$
COMPOSITION: 1.2 Na_2O: 1 P_2O_5
STRENGTH: P_2O_5 63.5%; pH of 1% solution is 7.2
SOLUBILITY: 150 parts in 100 parts of water at 75° F.

Sequestration and Water Softening Capacity
BLOCKSON SODIUM POLYPHOS



WATER SOFTENING—SEQUESTRATION Precipitation of calcium and magnesium salts, which normally occurs with increased temperature or alkalinity, is inhibited when minute quantities of Sodium Polyphos are added to hard water. Larger additions prevent precipitation by *forming inert complexes** with the hardness elements. Precipitates already formed will re-dissolve. These complexes won't react with soap added to cleaning bath or formed by saponification of greases and oils by alkaline detergents. Sticky, fabric-enmeshing and equipment-clogging soap curds are avoided. THUS SODIUM POLYPHOS IS A VALUABLE ADJUNCT TO EVERY DETERGENT OPERATION.

*Also forms inert complexes with metallic ions of iron, copper, nickel, manganese and zinc.

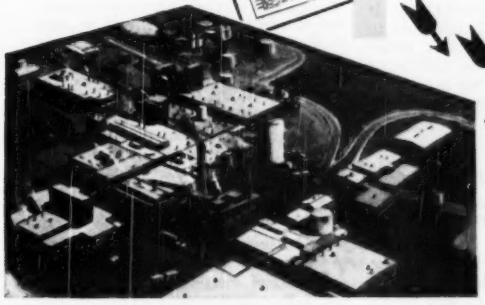
DISPERSION—Sodium Polyphos exhibits to a remarkable degree the property of increasing dispersion of finely divided solids in a liquid medium. Typical applications include: dispersion of clay for coating papers, reducing viscosity of muds for drilling oil wells, water suspension of organic pigments. These, and the listing below, may suggest experimental application to your own particular problem.

OTHER KNOWN USES—Industrial and municipal water treatment: for preventing scale formation, iron precipitation, and for corrosion control. Boiler compounds, dishwashing and detergent compounds, processing and dyeing of textiles, leather tanning, photographic film developing, flotation and desliming of minerals.

FOR FURTHER DATA AND SAMPLE MAIL COUPON

OTHER BLOCKSON CHEMICALS

- Sodium Tripolyphosphate Anhydrous
- Tetrasodium Pyrophosphate, Anhydrous
- Sodium Silicofluoride
- Sodium Fluoride
- Trisodium Phosphate, Crystalline
- Chlorinated Trisodium Phosphate
- Trisodium Phosphate, Monohydrate
- Disodium Phosphate, Anhydrous
- Disodium Phosphate, Crystalline
- Monosodium Phosphate, Anhydrous
- Monosodium Phosphate, Monohydrate
- Sodium Acid Pyrophosphate
- Light Alumina Hydrate
- Gloss White
- Sulfuric Acid



On this 200-acre site, an hour from the nation's railway hub, the vast BLOCKSON organization is coordinated into a closely knit group under intimate executive supervision for prompt service to American industry, large and small.

BLOCKSON CHEMICALS

*Sodium Polyphos is a brand name

BLOCKSON CHEMICAL CO., Joliet, Illinois
Send bulletin on Blockson Sodium Polyphos
Include sample: ☐ Ground ☐ Lump Walnut ☐ Lump Pea

Name ..... Title .....
Company ..... Street .....
City ..... Zone ..... State .....

MAIL COUPON BELOW

The BETTER the ODOR the BIGGER the SALES!

FASTIDIOUS FARMERS— CONTENTED COWS....

Control of cattle lice, flies and other insect pests is one of the economic necessities of modern farm and dairy operation. Indispensable in their war against disease-spreading insects are the powerful, *scientifically* deodorized livestock and cattle sprays now available. Without these, the work of farm and dairy production would be hopelessly hampered. . . . Our odor experts have contributed notably to this field. Perhaps they can do similarly for you.

PLEASE FILL IN AND MAIL

FRITZSCHE BROTHERS, Inc.
76 NINTH AVE., NEW YORK 11, N. Y.
We are interested in ☐ PERFUMES ☐ ODOR NEUTRALIZERS for use in the manufacture of products checked below. What do you recommend?

☐ FORMALDEHYDE ☐ ADHESIVES
☐ CLEANING COMPOUNDS ☐ INK
☐ FUEL OIL ☐ LUBRICATING OILS
☐ SPRAYS ☐ WAXES ☐ PLASTICS
☐ RUBBER ☐ LATEX ☐ LEATHER
☐ PAINTS or LACQUER ☐ TEXTILES
☐ ROOM or ☐ HOSPITAL DEODORANTS
☐ OTHER PRODUCTS: _____

COMPANY: _____
ADDRESS: _____
CITY: _____ STATE: _____
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FRITZSCHE Brothers, Inc.
Established 1871
PORT AUTHORITY BUILDING
76 NINTH AVENUE, NEW YORK 11, N. Y.

infestation which is the cause of insect fragments in flour and other grain meals, a matter of increasing concern to millers. Rate of application is 100 lbs. per thousand bu., or about 1.6 oz. per bu., giving protection at a cost to the farmer of about two cents per bu.

In both materials Pyrenone, a combination of a chemical, piperonyl butoxide, and pyrethrins, is mixed with or impregnates a carrier, which adheres to the grain kernels. Toxicological investigation has demonstrated the Pyrenones to be free of toxic hazards of any kind, says U.S.I.

The carrier used for the Pyrenone heat Protectant is finely pulverized wheat itself. The Grain Protectant is based on fibrous talc, or mineral.

Demonstrations have shown that the Pyrenone Protectants give protection against infestation for as long as 9½ months. U.S.I. states that though Pyrenones have been shown effective in eliminating heavy infestations, they are being recommended as protecting agents, rather than control measures, because of advantages of preventing shrinkage and dockage losses resulting from insect damage. Damage today ranges from 5 to 50% for stored grain, 3 to 14% for wheat. Farmers and country elevator operators have been known to take a loss of 45¢ per bu. in a $2 wheat market.

Drying Concentrate

Processing aid speeds oven drying.

Blue Dri-Water concentrate is a drying concentrate produced by the Miskella Infra-Red Co., Cleveland 4, O. It is designed to replace ordinary water for rinsing metal and other solid materials, to shorten drying time and reduce heat needed to dry-off surfaces for further processing. Blowing off by compressed air is usually eliminated, according to Miskella. It is claimed that solid objects made of glass, metals, plastics, etc., show no droplets or globules, so that almost instant drying-off is achieved with a short, low capacity oven.

Dri-Water can be applied by means of dipping tanks, or sprayed, brushed, directed to the work by flo-coat or needle point showerbath technique. It can be applied to heated parts and to electroplated surfaces. Prices range from $2.40 for a pint, to $12 for a gallon. Drum shipments are discounted 5%. The dilution is 1 oz. Dri-Water to 10 gal. water.

Maintenance Chemicals

Fine Organics introduces line of industrial and motor fleet maintenance compounds.

Ten products, designed to cover the major needs of industrial and motor fleet mechanical overhaul and maintenance shops, comprise the new line of "FO" chemicals offered by the Aviation-Industrial Chemicals Division of Fine Organics, Inc., 211 East 19th St., New York 3, N.Y.

The line is composed of: FO-101, safety solvent for electric motor cleaning; FO-105, quarternary ammonium disinfectant; FO-106, solvent emulsion grease cleaner; FO-108, liquid detergent—20% soap; FO-109, waterless cleaner; FO-114, oil cooler cleaner; FO-114, aluminum and brass polish; FO-116, cresol emulsion degreaser; FO-120, paint stripper; and FO-121, carburetor and engine parts cleaner.

Rubber Tackifier

Koresin, German war product, is now made in U. S.

American tire makers can now use koresin to improve the tackiness of synthetic rubber. Koresin was used by the Germans during the war, not only to conserve natural rubber but because koresin was found to be superior to crude rubber cement in improving the tack.

Koresin, now being produced in this country by General Aniline & Film Corp., is a condensation product of p-tertiary butylphenol with acetylene, in the form of brown lumps. It is identical with the German product. It is not primarily a softener, but is used in addition to the softener or as a partial replacement. In addition to its use as a tackifier for GR-S rubber stocks and GR-S rubber cements, it has possibilities as a lacquer and varnish resin and as an intermediate for suractants and tanning agents.

According to data supplied by Antara Products, General Aniline & Film, the tackiness increased from 6 to 15 oz. on a sample of GR-S painted with a 4% solution of koresin and from 12 to 27 oz. in a sample of GR-S milled cold with 10% koresin. With only 3% koresin the tack measured 21 oz.

Grease Stabilizer

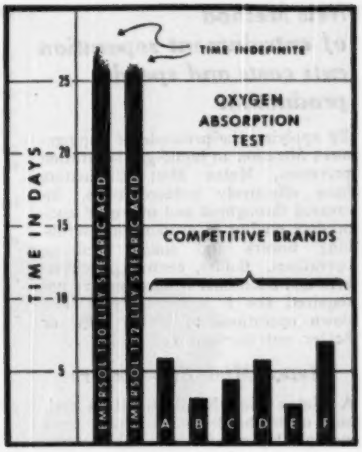
Antioxidant is effective in catalyzed and non-catalyzed systems.

To prevent oxidation of greases in storage and service, it is common practice to add a small amount of an antioxidant. A new product of Du Pont's Petroleum Chemicals Division, Ortholeum 300 is an effective stabilizer in both non-catalyzed and catalyzed systems. Its effectiveness is pronounced in the presence of catalytic metals such as brass, where it is sometimes difficult to obtain desired degree of stability by adding such compounds as phenyl-alpha-naphthylamine, according to Du Pont.

Ortholeum 300, a mixture of complex organic amines, combines antioxidant and metal deactivating properties, to retard normal oxidation and to reduce the harmful catalytic effect of metals. It has been evaluated in

Oxygen Absorption Test Proves:

AMAZING STABILITY OF EMERSOL STEARIC & PALMITIC ACIDS!



TRIPLE-PRESSED TYPE

Emersol 140 Palmitic Acid performance is comparable to that of Emersol 130.

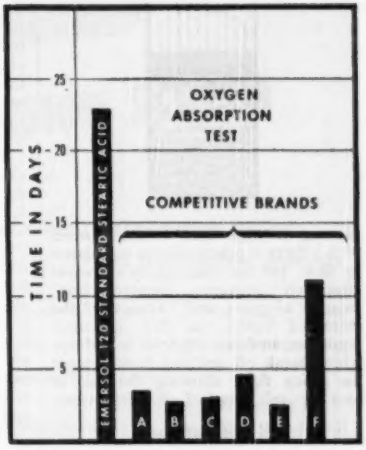
Almost Zero Peroxide Values Also Prove Extreme Resistance To Oxidation!

Your finished products are only as good as the STABILITY of the fatty acids you use. New processing techniques have enabled Emery to produce Stearic and Palmitic Acids exhibiting the highest color, odor, and oxidation stabilities available . . . all properties which reflect in and are important to finished products.

The oxygen absorption test, which measures the time required for the absorption of a standard quantity of oxygen in a closed system, illustrates the superior stability of the Emersol Stearic Acids.

As further proof of this outstanding stability, peroxide values, a convenient means of measuring the extent of oxidation, on both fresh and stored Emersol Stearic Acids are practically zero in all cases . . . again far superior to competitive grades.

Be assured of the highest grade products with maximum shelf life by specifying Emersol Stearic and Palmitic Acids. Send for free booklet and see how Emery Solid Fatty Acids will make your products better . . . stay better longer!



DOUBLE-PRESSED TYPE

EMERY
INDUSTRIES, INC.

CAREW TOWER, CINCINNATI 2, OHIO
EXPORT DEPT.: 5035 R.C.A. Bldg., New York 20, New York

BRANCH OFFICES
3002 Woolworth Bldg., New York 7, N. Y. • 187 Perry St., Lowell, Mass. • 401 N. Broad St., Philadelphia 8, Pa. *Warehouse stocks also in St. Louis, Buffalo and Baltimore.*

REPRESENTATIVES
Clarence Morgan, Inc., 919 N. Michigan Ave., Chicago 11, Illinois • Schibley & Ossmann, Inc., 33 Public Square, Cleveland 13, Ohio • Ecclestone Chemical Co., 2673 Guoin, Detroit 7, Michigan

GET ALL THE FACTS ABOUT EMERY'S SOLID FATTY ACIDS!

Emery Industries, Inc., Dept. I-9
Carew Tower, Cincinnati 2, Ohio
Gentlemen:

Please send me the new comprehensive bulletin giving complete characteristics and properties of Emery's Solid Fatty Acids and their effect on finished products.

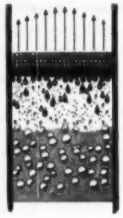
Name ..... Title .....
Company .....
Address .....
City ..... State .....

New Method of entrainment separation cuts costs and speeds production

By applying the principle of impingement filtration to liquid-gas separation processes, Metex Mist Eliminators have effectively reduced costs, increased throughput and improved end-product quality in evaporators, scrubbing towers and similar refining operations. Baffles, centrifugal chambers and additional head room are not required, nor is it necessary to slow down operations to secure 90% or better entrainment removal.

Metex Mist Eliminators

A Metex Mist Eliminator is a pad, built up to the desired thickness from multiple layers of wire mesh, *knitted* —not woven—of corrosion-resistant metal. Constructed in sections for easy assembly, and cut to fit, Mist Eliminators are installed inside refining equipment and across the line of gas flow.



Having a high free volume (often 98%) there is practically no impedance to flow, yet the multiplicity of wires effectively prevents "straight line" passage of gases, and "wipes out" the entrained liquid. As this impinged liquid accumulates, it grows into drops which break off and fall back against the rising flow, allowing the gas to pass through, freed of all entrainment.

Applications

Installations to date have been largely in petroleum refining and petro-chemical operations where increased production, purity of output and lowered costs have been repeatedly demonstrated. That the use of Metex Mist Eliminators in other operations where purification of gases is essential, will be similarly effective is indicated by this record of performance.

Our engineers will be glad to consult with you on the possible adaptability of Mist Eliminators to your processing operations. A letter, addressed to Mr. R. L. Hartwell, Executive Vice President, outlining briefly your process and the products involved, will bring a prompt reply and a copy of our brochure, "Metex Mist Eliminators". No obligation of course.

METAL TEXTILE CORP.

635 East First Ave. Roselle, N. J.

many types of greases. The concentration required varies in different greases but usually falls within the range 0.2 to 1.0% by weight. It is added to the grease during the cooling period following the last high temperature step in the process.

Precautions must be exercised in handling Ortholeum 300, since it contains a toxic aromatic amine. Air masks or adequate ventilation must be provided, and other safety procedures must be followed.

The product is supplied in packages, 50 gal. fibre drums containing 175 lb. net. Shipping point is Carney's Point, N. J.

Electric Insulation

Plastic insulator has non-flammable feature.

A plastic electrical insulation which will not support combustion has been developed by the Du Pont Co.'s Polychemicals Dept. Offered to wire, cable, and electrical industries as Rulan flame retardant plastic, it has shown in tests that it will not burn after the flame has been removed, unlike many plastics with good electrical properties. Neither will it drip when molten, says Du Pont, a further advantage since hot plastic drippings are likely to start other fires.

Its electrical properties are comparable to, although not the equivalent of those of polythene. Rulan has a power factor, over a wide range of frequencies, of 0.002, as compared with 0.0002 for polythene. Its dielectric constant of 2.7 compares with that of less than 2.5 for polythene. The new plastic insulation is non-tracking and retains its electrical properties after immersion in water at elevated temperatures. According to Du Pont testing results, its low-temperature properties may be classified as excellent and its mechanical properties as good.

Du Pont expects Rulan to find use as insulation for high-voltage line wires, street-lighting cables, etc. The plastic can be extruded on to wire at high speeds, or injection molded. Molded electrical parts and extruded electrical tape are being developed.

• **New bulk packings** of Penicillin Potassium G Buffered Tablets and Penicillin Potassium G Soluble Tablets are now offered by Winthrop-Stearns, Inc., N. Y. Both products, previously available in bottles of 12's, now come in 50 and 100 thousand units in 100's. The Penicillin Buffered Tablets are also packed in 500's.

• **A pre-gelatinized flour starch,** for use by manufacturers of "instant" type puddings and wherever fast solubility without heating is desired, has been put on the market by National Starch Products, Inc., 270 Madison Ave., New York 17, N. Y. Instant-Jel is the name of the processed tapioca. It forms gels in cold water, cold milk or fruit juice solution, and is said to have little or no starchy or cereal taste, and to exhibit good stability under fairly acid conditions.

• **Neovacagen is an oral vaccine tablet** combined with an antihistaminic compound recommended to stimulate immunity against secondary bacterial invaders in respiratory infections. Sharp & Dohme, Inc., Philadelphia, produces the tablets, which are prepared from soluble antigenic substances obtained from bacteria usually associated with respiratory infections. Each Neovacagen tablet contains 25 mg. of methapyrilene hydrochloride together with the antigenic substances. The product is supplied in bottles of 20 and 100 tablets.

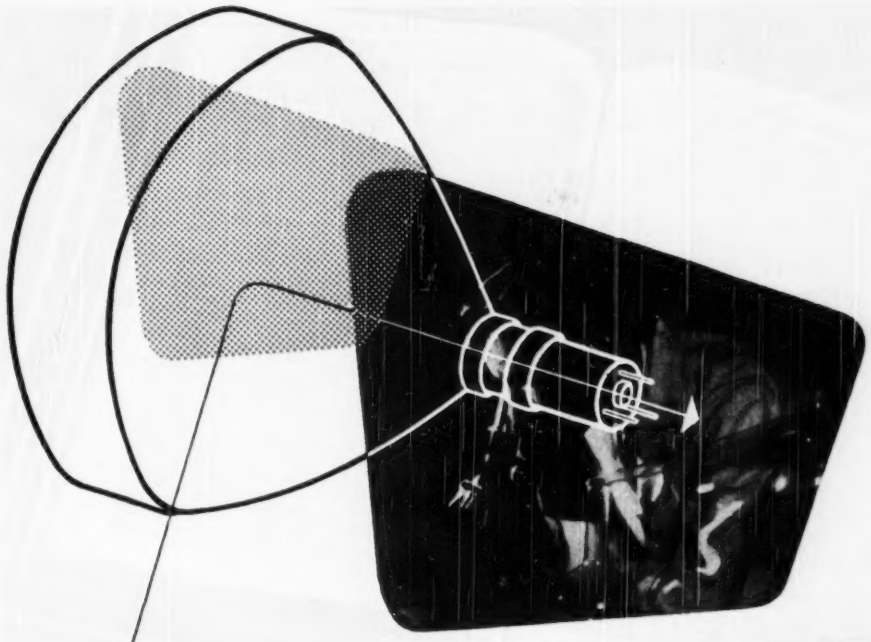
• **A new highly potent vitamin and mineral formula** in capsule form, called Calirad Super, is now being offered by Winthrop-Stearns, Inc., 170 Varick St., New York 13, N. Y. Indicated primarily for use in pregnancy, it is also valuable for correcting other nutritional deficiencies.

The formula per capsule is as follows: vitamin A, 1,500 USP units; vitamin D (Viosterol), 300 USP units; vitamin B_1, 1 mg.; vitamin B_2, 1 mg.; vitamin C, 30 mg.; niacinamide, 8 mg.; potassium iodide, 0.1 mg.; dicalcium phosphate, anhyd., 568 mg.; ferrous gluconate NF, 50 mg.; menadione USP, 0.15 mg.

• Winthrop-Stearns, Inc., N. Y., has modified its formula for **procaine penicillin** for aqueous injection. Added to the previous formula is a 1% sodium citrate content, which acts as a buffering agent. The company states the resulting product is "more stable and more easily suspended."

• **The trade name, Stilbetin,** for its diethylstilbestrol tablets has been adopted by E. R. Squibb & Sons. Stilbetin Tablets, used in high potency doses to control threatened accidents of pregnancy, will be available in bottles of 100 and 1,000 in strengths of 0.1 mg., 0.25 mg., 0.5 mg., 1.0 mg., 5.0 mg., and 25.0 mg.

• Monsanto Chemical Co.'s **wetting agent,** Santomerse No. 1, is having its first large-scale application this summer for a new use—helping to allay dust on dirt-tracks during car and motorcycle races at county fairs and speedways. Auto Racing Inc., Minneapolis, Minn., is adding it to sprinkler water in small amounts to make the water "wetter" and better able to penetrate and moisten dust particles.



THE VISION BEHIND YOUR TELEVISION SCREEN

Mallinckrodt Chemicals of almost unbelievable purity help "brighten the picture" in TV—and many other products

The quality of a television image depends largely on the quality of the chemicals that go into the complex makeup of the tube: cathode emissive material, phosphors, and screen-laying solutions.

Typical of the Mallinckrodt Fine Chemicals for television is our special grade of *Sodium Sulfate*. Impurities are reduced to such infinitesimal traces that chemists can scarcely believe its analysis (left).

The far-sighted vision of Mallinckrodt research that gives the industry such products today may give *your products* better reception tomorrow. Starting materials of Mallinckrodt uniform purity help reduce rejects, maintain higher quality at lower cost in many plants. They may do the same in yours, too. Call your nearest Mallinckrodt representative or write:

QUANTITATIVE SPECTOGRAPHIC ANALYSIS OF A TYPICAL LOT OF MALLINCKRODT SPECIAL SODIUM SULFATE

Copper		0.3 ppm
Silver	Less than	0.1 ppm
Bismuth	Less than	0.1 ppm
Cobalt	Less than	0.5 ppm
Chromium	Less than	0.5 ppm
Cesium	Less than	0.1 ppm
Iron		0.2 ppm
Lithium		0.9 ppm
Manganese	Less than	0.1 ppm
Nickel	Less than	0.5 ppm
Aluminum		15.0 ppm
Barium	Less than	0.1 ppm
Cadmium	Less than	0.1 ppm
Lead		1.2 ppm
Silicon	Less than	1.0 ppm
Tin		0.3 ppm
Strontium	Less than	0.1 ppm
Titanium	Less than	0.5 ppm
Zinc	Less than	1.0 ppm

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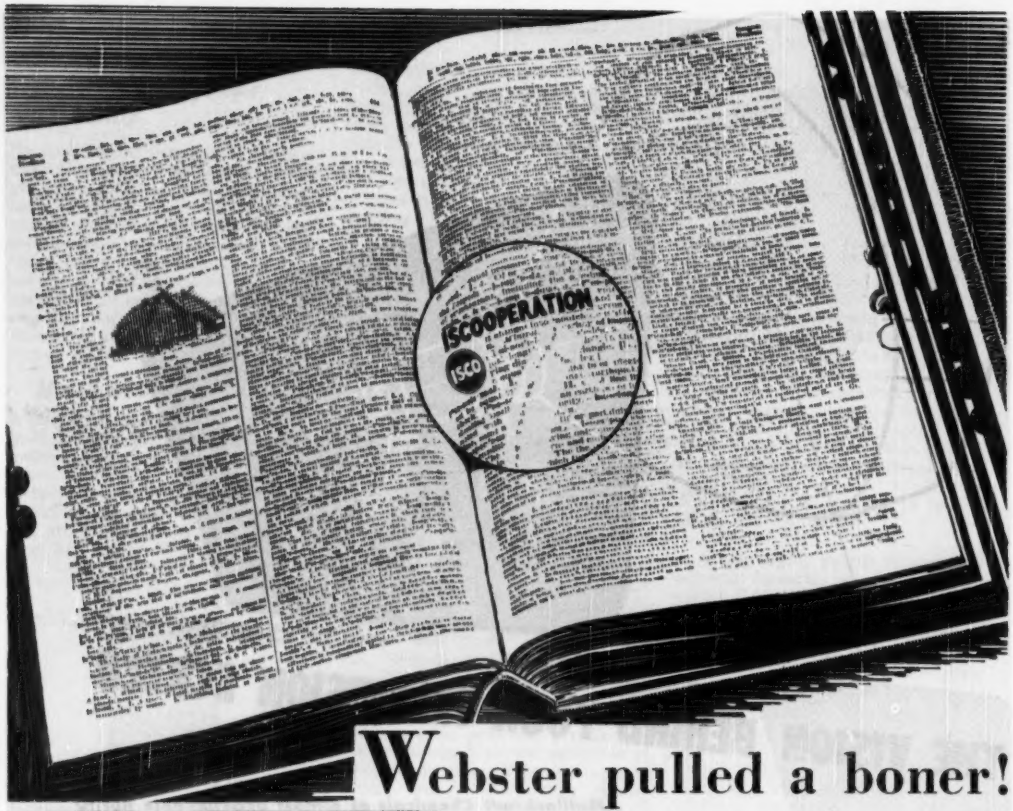

Webster pulled a boner!

SOME ISCO PRODUCTS

Ferric Chloride
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Crude, Refined, Sunbleached

Potash
Caustic & Carbonate

Gums
Arabic, Karaya, Locust, Tragacanth

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WHEN Noah Webster was compiling his dictionary in the early 19th century, he forgot to approach the thriving, young firm of Innis, Speiden for a definition of the word "ISCOoperation". ISCOoperation means, of course, that Innis, Speiden & Co., with all its "operating" plants and branch offices, is ready to "cooperate" with you in solving production and supply problems.

But better than a definition . . . have an ISCO representative give you a working demonstration of ISCOoperation! You'll find he is a young "old-timer" with an average of 15 years practical experience in the chemical field. He'll be frank to admit it if he cannot solve your problem on the spot, but will gladly call on the technical know-how of the ISCO laboratories in Jersey City and Niagara Falls.

Webster pulled a boner, but you need not miss the benefits of ISCOoperation!

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SAN FRANCISCO • LOS ANGELES

TRADE MARKS OF THE MONTH

From Official Gazette—Vol. 633, No. 4, and Vol. 634, Nos. 1, 2, 3.

LECITHUNITE. Chemical compound comprising lecithin, Irish moss and glyceride for use making of bakery products. 560,674. Modern Maid Products.

O-SOKLEEN. Washing powder having water softening properties. 561,657. Coast Products Co.

skuf shine. Shoe polish. 562,363. Hollywood Shoe Polish, Inc.

Flextex THE UNIVERSAL FIRST COATER FOR ALL SURFACES. Priming material for all paint purposes. 562,757. Chicago Paints, Inc.

Major Spar for the Majority of Uses. Varnish. 562,758. Chicago Paints, Inc.

CELLU-LOK. Liquid resin-base adhesives for adhering transparent sheeting of cellulose acetate and regenerated cellulose types. 563,789. National Starch Products, Inc.

DRIPCO SPECIAL Liquid disinfectant for urinals and water closets. 563,880. West Disinfecting Co.

KIWI LEATHER COSMETIC. Polishing preparations for boots, shoes, and leather goods. 565,188. Kiwi Polish Co. Proprietary, Ltd.

ORLON. Synthetic fiber-forming polymers and copolymers of acrylic acid or its derivatives produced in the form of fibers for further use in the industrial arts. 565,922. E. I. du Pont de Nemours & Co.

PETROWET. Surface active agents used for acidizing oil wells, and as dyeing assistants and penetrants in the textile industry, etc. 566,922. E. I. du Pont de Nemours & Co.

"WIST". Liquid sterilizer for refrigerators. 566,932. Harf, Inc.

SILVER GLO. Paste-like chemical compound for use as a softener and lubricant during the finishing process of textile materials. 567,362. Carolina Aniline and Extract Co.

Krusader. Preparation for cleaning and removing grease, having incidental water softening properties. 567,674. Arwell, Inc.

EPHETA. Water scale remover for use in water boilers. 567,730. Epheta Corp.

Phillips 66. Livestock spray, soluble powder type radiator cleaner, liquid radiator stop leak, radiator anti-freeze, insecticides, hydraulic brake fluid, liquid acid type radiator flush, household disinfectant, spray concentrate, oil base chemical wood preserver and mite killer, and miscellaneous organic chemicals. 568,210. Phillips Petroleum Co.

Sergeant's SKIP-STAIN. Liquid preparation for removing stains from fabrics and textile materials caused by animals. 568,211. Polk Miller Products Corp.

Sergeant's SKIP-STAIN. Liquid preparation for removing stains from fabrics and textile materials caused by animals. 568,275. Polk Miller Products Corp.

THE LYNN. Shoe polishes, and combination shoe polish and cleaner. 569,756. George J. Kelly, Inc.

PARKER PROCESSES. Chemicals for rust proofing and rust inhibiting, preparing metals for wear resistance, treating metals as an aid to drawing. 569,770. Parker Rust Proof Co.

STAKLEEN. Spot remover for removing spots from fabrics. 569,975. Kali Mfg. Co.

ONYX-10. Coloring agent or pigment for use in paints. 570,093. Godfrey L. Cabot, Inc.

TODAY. All purpose household cleaning compound. 570,383. Schalk Chemical Co.

Perma Glaze. Chemical composition in liquid form to be sprayed on furs to improve their luster. 570,386. Security Fur Seal Co., Inc.

MORAX. Petroleum wax composition containing a resin for use in the industrial arts 570,511. Moore & Munger.

GLOSSINE. Printing ink. 571,380. Interchemical Corp.

SNAP. Printing ink. 571,381. Interchemical Corp.

OLD BALDY. Hog scalding compound for removal of hair and bristles. 571,731. Raymond H. Starr.

EXSIZE-T. Preparation for sizing and finishing textile fibers and fabrics. 572,117. Pabst Brewing Co.

KOLENE. Dry cleaning solvents and fused salts for forming molten salt baths for cleaning metals. 572,254. Kolene Corp.

Magic. Silicone impregnated paper and for booklets and packages containing sheets of such paper distributed for cleaning eye glasses and other cleaning purposes. 572,459. Silicone Paper Co. of America, Inc.

CORROGEN. Corrosion inhibiting water treating chemicals. 572,628. W. H. & L. D. Betz.

PROLASE. Proteolytic enzyme preparation for industrial use. 572,931. Wallerstein Co., Inc.

QUESTRAL. Water softener and conditioner. 574,083. Ru-Tay Products, Ltd.

BEST IN THE LONG RUN MARATHON. Anti-freeze. 574,157. Ohio Oil Co.

CAMPAL. Liquid insect repellent. 575,218. Miller-Allbritton.

DRIL JEL. Starch and starch products for industrial purposes. 575,252. Corn Products Refining Co.

DELETCH. Chemical compounds sold in solution used in processing lithographic plates. 575,400. Andrew J. George.

PLASTRIP. Strippable synthetic resinous plastic coating material. 575,549. Protective Treatments, Inc.

CHAMPION. Embalming fluids. 575,569. Champion Co.

3. Gas welding flux. 575,706. International Nickel Co., Inc.

Dixie. Photoengraving and photomechanical supplies. 575,843. Chemco Photoproducts Co., Inc.

TA-ANT. Ant poison. 576,050. Fleming Drug Co., Inc.

DUROBRITE. Chemical compound in liquid form used as an addition agent in a zinc electroplating process to improve uniformity and appearance of the plated surfaces. 576,114. E. I. du Pont de Nemours & Co.

SASCO. Sulphur in powder form used for agricultural dusting as an insecticide and fungicide and in the manufacture of rubber. 576,142. Mathieson Chemical Corp.

WHITE DIAMOND. Insecticides and fungicides. 576,169. Mathieson Chemical Corp.

PHOSTEEL. Syrup consisting principally of phosphoric acid used for making solutions for treating metal articles to produce phosphate coatings thereon. 576,460. DuLite Chemical Corp.

MAFLEX. Industrial plasticizer from corn syrup. 576,736. American Maize-Products Company.

FABREZ. Aqueous dispersion containing monomeric dimethylol urea used for treating fabrics to impart crush and wrinkle resistance thereto. 576,985. Reichhold Chemicals, Inc.

ACCOBRITE. Rosin size for use in the manufacture of paper. 577,025. American Cyanamid Co.

Diagravure. Screen printing ink. 577,083. Ulano Products Co.

Schmincke. Artists' drawing ink. 577,572. M. Grumbacher, Inc.

Schmincke. Artists' paints. 577,573. M. Grumbacher, Inc.

WARE-O-CIDE. Insecticides. 577,725. Midland Labs.

PARA DE CARB. Liquid moth repellent. 577,799. Rite Chemical Products Co.

MOTH CHAMP. Insecticides. 577,946. Cosmetest, Inc.

MASTER SERVICE. Exterior and interior ready-mixed house paints; varnish for floors and woodwork; paraffin floor oil; wall paint primer, and various paints, varnishes, enamels, lacquers and their thinners. 578,072. Central Hardware Co.

RD-119. Corrosion inhibitor. 578,291. Sinclair Refining Co.

SANITONE MC. Mothproofing preparations. 578,779. Emery Industries, Inc.

SANITONE NA. Chemicals used to render fabrics receptive to water repellent preparations. 578,780. Emery Industries, Inc.

SANITONE WR. Water repellent preparations for use on fabrics. 478,781. Emery Industries, Inc.

PHOSFUME. Insecticide. 579,359. Everon son Hayward Chemical Co.

Everon. Resinous starch. 579,407. Everon Amidon Corp.

Y-P-Z. Paint enamel for automobiles. 579,773. Abel Corp.

BON SOIR BUG "GOOD NIGHT BUG". Insecticides. 580,045. Bon Soir Bug Co., Inc.

ZINOX. Liquid paint drier. 580,302. Keystone Varnish Co.

OZEX. Insecticides. 580,389. Woodlets Inc.

FAFS. Air deodorizer. 580,436. Sheredin Co., Inc.

Silikill. Insect killing compound. 580,538. Waxed Silicone Products, Inc.

BIOFAST. Resinous powder and liquid for gelling and setting to manufacture dentures, consisting of a selfcuring acrylic mixture. 580,651. B. L. Dental Co., Inc.

SILOK. Ready mixed quick drying primer sealer comprising an alcohol soluble synthetic resin for interior walls and woodwork. 580,688. James B. Sipe and Co.

PLEX-O. Household laundry starch. 580,904. Sage Labs., Inc.

MOMORT. Insecticides. 583,386. Crystal X Corp.

AMAX. Accelerators for the vulcanization of rubber. 583,867. Goodyear Tire & Rubber Co.

***DRY-SOL.** Lumber drying fluid derived from petroleum oil product which is free of carbon, is non-lubricating, contains paraffine. 524,678. Durable Wood Preserving Co.

CETYLCIDE. Germicidal concentrate and a cold disinfectant for surgical and dental appliances and instruments. 526,203. Cetylite Industries, Inc.

National. Synthetic resin varnish used as a coating compound for carbon and graphite equipment and apparatus in the chemical and metallurgical industries. 525,923. Union Carbide and Carbon Corp.

TEXEL TAPE. Pressure-sensitive adhesive tapes. 575,909. Industrial Tape Corp.

(Symbol) Pressure-sensitive adhesive tape. 576,810. Industrial Tape Corp.

COLORAMIC. Bonding compound in paste form for adhering brake lining material to automotive brake shoes. 580,350. Barrett Equipment Co.

RHOPLEX. Resin suspensions or dispersions suitable for use as adhesives, binders, or tackifier. 585,545. Rohm & Haas Co.

MONSANTO. Synthetic resins in the form of emulsions and solutions for general use in industrial arts. 587,549. Monsanto Chemical Co.

MAGIDIZ. Dyes and dressings for leather goods and the like. 571,227. Magidiz Co.

AEROLITE. Synthetic resins sold in solid, liquid, or powdered form for industrial purposes, and molding of casting compositions. 572,016. Ciba Ltd.

SITOL. Chemical substances used as protective oxidizing agents in coloring textile fabrics. 572,356. E. I. du Pont de Nemours & Co.

KOPRCOTE. Photomechanical and photoengraver's supplies. 575,844. Chemco Photoproducts Co.

MICROBOMB. Pressure release vaporizer containing glycol used for the reduction of airborne bacteria. 576,311. Carand Corp.

Enamel Clad. Coating composed of asbestos fiber and asphalt composition for roofing and insulating purposes. 556,480. Philip Carey Mfg. Co.

MANCO. Asphaltic composition for insulating purposes. 556,482. Philip Carey Mfg. Co.

Leadco. Pipe and tool joint compound. 574,208. Chemicals, Inc.

PARK AVENUE BRAND. Floor leveling and bonding materials. 574,758. Harold N. Davis Co.

CAVALCADE OF COLOR. Ready-mixed flat and gloss finish oil paints for interior and exterior use, and paint enamels. 576,412. Keystone Varnish Co.

ATOLAK. Detergent powder for use as a general cleaner and a liquid cleaner for enameled, lacquered, and metal surfaces. 570,083. Atomix Inc.

LITHOTONE. Photographic developer. 525,546. Mallinckrodt Chemical Works.

KIWISPORT. For boot, shoes polishes and waterproofing materials for boots, shoes, harness, etc. 565,187. Kiwi Polish Co., Proprietary Ltd.

WOLCO GLARET. Gummed paper tape and gummed cloth tape for general use. 579,682. General Gummed Products, Inc.

FLURITE. Bleaching textile fabrics. 528,529. R. R. Street & Co., Inc.

O-CEDAR. Insecticides. 541,767. O-Cedar Corp.

G-4. 2,2'-dihydroxy-5,5'-dichloro diphenyl methane suitable as active ingredient in bactericidal and fungicidal preparations. 550,748. Sindar Corp.

Lyquaface. Chemicals for use in coating foundry sands to improve the casting characteristics thereof. 551,839. Whitehead Brothers Co.

KETAC. Ketone formaldehyde resins. 553,237. American Cyanamid Co.

POLIFLEX. Preparation for seasoning and finishing leather. 565,180. John R. Evans & Co.

LUSTREX. Synthetic resins in solution and emulsion forms for coating, impregnating, sizing, or waterproofing paper, textiles, or composition sheet material. 566,635. Monsanto Chemical Co.

PYDRAUL. Hydraulic fluids for use in hydraulic power transmission systems and general use in the industrial arts. 568,385. Monsanto Chemical Co.

PYDRAULIC. Hydraulic fluids for use in hydraulic power transmission systems and general use in the industrial arts. 568,386. Monsanto Chemical Co.

SKYDRO. Hydraulic fluids for use in hydraulic power transmission systems and general use in the industrial arts. 568,387. Monsanto Chemical Co.

SKYLUBE. Hydraulic fluids for use in hydraulic power transmission systems and general use in the industrial arts. 568,388. Monsanto Chemical Co.

SKYTROL. Hydraulic fluids for use in hydraulic power transmission systems and general use in the industrial arts. 568,389. Monsanto Chemical Co.

GLYCOCILIN. Solution of sterilization-grade triethylene glycol for vaporization into the atmosphere. 568,878. Glycolizer Corp.

DYNACIDE. Insecticides and fungicides. 569,901. William M. Stieh & Co., Inc.

INFECTASIDE. Air spray to destroy air

(Turn to page 454)

* The following are from Official Gazette, Vol. 634, Nos. 4, 5, and Vol. 635, Nos. 1, 2, 3.

NEW PRODUCTS & PROCESSES

Molding Compounds

Tennessee Eastman offers molders new forms of Tenite.

Offered for the first time are three Tenite pearls in light colors, designated as "A," "B," and "C" Pearls. "A" Pearls are available in both Tenite I and Tenite II at a price ten cents per pound higher than the transparents. "B" and "C" Pearls are priced the same as translucents, metallic pearls, and special-grade blacks. "B" Pearls are available in Tenite II; "C" Pearls in both Tenite I and Tenite II. Wavy, iridescent effects are obtainable in the new pearls by using two components of different flows, to be mixed by the molder. Components are priced separately in accordance with the quantity bracket in which each falls. A flat sheen is secured when a single flow is used.

Also offered for the first time to the trade generally are new lubricated formulas of Tenite I, which have virtually the same physical properties as the corresponding unlubricated formulas, and are intended for use on jobs where molds are hard to fill and where better than average mold release is desired.

Samples of the new Tenite pearls, may be obtained upon request to Tennessee Eastman Corp. at Kingsport, Tenn.

Ethylene Trithiocarbonate

New synthetic organic chemical made available by Stauffer.

Stauffer Chemical Co. offers ethylene trithiocarbonate, a bright yellow to brown crystalline solid. It is suggested, among other uses, as an intermediate in the manufacture of organic chemicals, in the vulcanization of rubber, as a flotation agent, a sulfur solvent and as an ingredient of extreme-pressure lubricants. Inquiries for samples, further data, etc. are invited at the company's New York offices at 420 Lexington Ave.

Cation Exchanger

New ion-exchange resin combines advantages of two resins which it replaces.

Now commercially available from the Resinous Products Division of Rohm & Haas Co. is a new medium-capacity cation-exchange resin, designated as Amberlite IR-105G. Because the new exchanger combines the excellent hydraulic behavior of Amberlite IR-100 with the high capacity and regeneration efficiency of IR-105, it has replaced those products in the company's series of ion-exchange resins.

The new IR-105G is a phenolic-type resin furnished in granular, rather than beaded form, giving it improved hydraulic characteristics. Its physical ruggedness and chemical stability have been substantiated over a three-year period in small commercial-scale units. Its high regeneration efficiency adapts it particularly to hydrogen cycle operation, making it especially useful in deionization and split-stream dealkalization. In the sodium form, it is also suitable for water softening. Laboratory notes on its behavior and applications are available from the manufacturer.

Carbon Black

Longer-wearing rubber said to offset higher cost of Phillips' new black.

A new carbon black just developed by Phillips Petroleum Company research and now produced on a semi-commercial scale promises to give increased wear resistance to rubber and add more miles to tire life.

The new carbon black when used with "cold' rubber is expected to produce tire treads having 25 to 50 per cent better wear resistance than similar treads compounded with the best commercially available carbon black.

The new carbon black, called SAF black, is produced from oil by a continuous process in equipment of unique design suitable for large-scale commercial plant operation. Samples are being distributed to the rubber industry for evaluation in laboratories and on the highways. Although cost per pound of the new black probably will be somewhat higher than that of the abrasion resistant blacks now on the market, cost per mile of tire life promises to be lower.

N-Chlorosuccinimide

Chlorinating and oxidizing agent useful in disinfection and as a reagent.

Arapahoe Chemicals, Inc., 2800 Pearl St., Boulder, Colo., has added N-chlorosuccinimide to its line of fine organic chemicals.

The compound has a mol. wt. of 133.54, contains a minimum of 26.2% active Cl, decomposes at 145°C, and is a white powder with a mild odor of chlorine. It is a chlorinating and oxidizing agent, giving good yields of benzyl chloride from toluene, for example, and of benzaldehyde from benzyl alcohol.

It is useful for purification of small quantities of water and as a laundry disinfectant, where it shows excellent qualities with respect to cotton and wool fading.

The material is stable if protected from moisture and light, and can be stored conveniently in brown glass bottles. Samples are available from the firm.

High-Viscosity Alkyd

Medium soya oil alkyd solution bodied to higher viscosity

A demand of the paint industry for a medium soya oil alkyd soltion at a higher viscosity range has resulted in the commercial development of such a resin by the Plaskon Division of Libbey-Owens-Ford Glass Co., Toledo 6, Ohio.

The new resin has been designated Plaskon 3187 and is intended primarily for use in architectural finishes, porch and deck paint, and industrial primers and finishes. It is chemically identical to Plaskon 3185 but is bodied to a higher viscosity.

Solution Constants

Solids	50 ± 1%
Solvent	Mineral Spirits
Color (I.P. + V.R.)	3—7
Acid Number	2—5
Viscosity	Z₃—Z₆
Solids (%) Vis. C-E	32.5
Pounds per Gallon	7.63

Solids Constants

Phthalic Anhydride (%)	35
Oil (%)	50
Oil Type	Soya
Rosin	None
Phenolic Resin	None
Specific Gravity	1.10

Porcelain Enamel Flakes

Advantages claimed for new flakes over traditional water-quenched frit granules.

Ferro Enamel Corp., 4150 E. 56th St., Cleveland 5, Ohio, has introduced a new product to replace the traditional water-quenched frit granules which have been the basic material for porcelain enamel.

The new product comes in thin "flake" form. It promises to make possible lower cost production, greater uniformity and easier quality control through faster and more uniform grinding, elimination of dust in loading of mills, improved stability of set and more uniform bubble structure. The "flakes" are produced without the traditional water quenching in special, wholly-automatic smelters.

Production is now on a limited scale.

Vinyl Latex

Dow offers low-cost latex based on vinyl-vinylidene chloride.

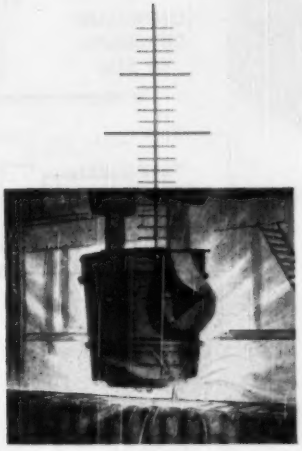
A new, low-cost addition to its line of latices, Dow Latex 744, has been announced by the Dow Chemical Co.

Major uses for Dow Latex 744 are in the fields of paper coatings, unwoven fabric bonding, textile coatings and industrial paints. The resin in the new latex is a copolymer of

In radio sonde batteries

for high altitude balloons . . .

or in exacting analytical work



Whenever Quality counts

. . . the first choice is

B&A *"Quality"* Perchloric Acid

There can be no compromise in the quality of the Perchloric Acid used as an electrolyte in the radio sonde batteries of high altitude meteorological balloons. For this and a score of exacting industrial applications, purchasing agents, production men and engineers alike make B&A Quality Perchloric Acid their first choice!

And there can be no mistakes in chemical analysis of steel, for the quality of an entire batch may depend upon its accuracy. That's why so many careful chemists use only B&A Reagent, A.C.S. Perchloric Acid for their determinations.

. . . That's because they know B&A Perchloric Acid always meets the most exacting specifications . . . by the ounce or by the ton. The result—a product of highest purity, particularly low in iron and other heavy metals.

For your requirements—from small bottle lots for laboratory use to carloads for process use—be sure . . . specify B&A Quality Perchloric Acid. Your nearest B&A Office can ship promptly from nation-wide distributing points.

REAGENTS

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GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

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PRESERVE . . . DEOXIDIZE . . . REDUCE . . .
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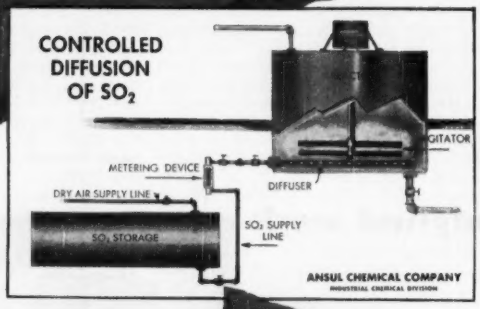

Better
QUALITY CONTROL
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With the

IN *One Continuous* OPERATION

ANSUL CONTROLLED DIFFUSION METHOD

ANSUL SO_2 is a volatile, easy to control, *multi-purpose* acid. It permits the user to . . . . 1) combine a number of individual process steps into one simple operation . . . . 2) easily remove many product impurities sometimes difficult to eliminate . . . resulting in *improved process efficiency* and *better quality control* of the finished product.

LIQUID Sulfur Dioxide ANSUL
99.98% (by weight) PURE
• REG. U. S. PAT. OFF.

Write for Bulletin No. C-109 for more information and if possible, include a description of the application in your plant. Our Technical Staff will help you take full advantage of the benefits outlined above. In addition to our Bulletin describing the Ansul Constant SO_2 Concentration System, we will send you an informative treatise describing the properties, characteristics and industrial uses of Liquid Sulfur Dioxide . . . An Ansul Technical Staff Publication.

For your METHYL CHLORIDE applications
Use ANSUL METHYL CHLORIDE

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INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WISCONSIN
60 E. 42nd St., New York—Lincoln-Liberty Bldg., Broad & Chestnut Sts., Philadelphia 7, Pa.

vinyl chloride and vinylidene chloride. It is characterized by excellent heat and light stability, wide compatibility with modifying materials, and good stability to shipment, storage and processing.

A technical data bulletin may be had without cost, by addressing the plastic sales division at Midland, Mich., or any of the Dow sales offices throughout the country.

Alkyd Resin

General Mills offers pentaerythritol ester of rosin, fatty acid and maleic anhydride.

Modiphat 345—a new alkyd resin which is pentaerythritol ester of rosin, fatty acid and maleic anhydride—is making its debut in the Chicago, Milwaukee and Philadelphia areas. Its producer, General Mills Research Laboratories, Minneapolis, is introducing the varnish resin to industry with a city-by-city field-evaluation and test-market campaign. Next area on the schedule may be Detroit.

Modiphat 345 is described as a fast-drying, oil-soluble alkyd resin made with fatty-acid mixtures containing substantial amounts of conjugated linoleic acid. When heated slightly, it disperses rapidly in oil, producing rapid-drying varnishes that yield hard, tough films with excellent color and resistance to water and alkali.

The new resin is compatible with dehydrated castor oil, linseed and tung oils, and effectively removes the after-tack of dehydrated castor oils with which it is used. It is also compatible with the phenolics, modified phenolics and rosin esters.

Modiphat 345 is soluble in ethyl acetate, benzol, toluol, xylol and mineral spirits at 20°C. and at boiling temperature. Under these same conditions, it is insoluble in ethyl alcohol.

Samples of Modiphat 345 are available to interested firms in the test-market areas. Single drum quantities for large-scale evaluation are also being offered.

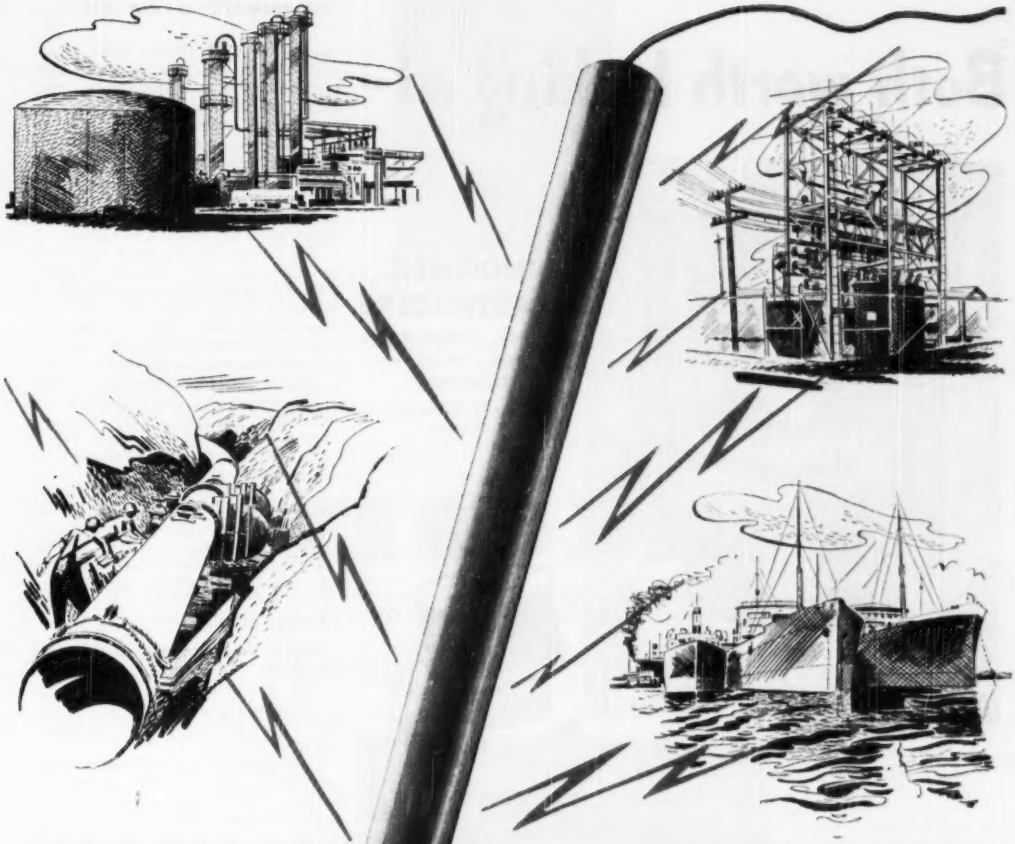
Vinyl Insulation

New Geon insulating compound is designed for high-temperature service.

A new vinyl insulating compound, especially designed for high temperature service (105°C maximum), is made from Geon, a product of B. F. Goodrich Chemical Co., 324 Rose Building, Cleveland 15, Ohio.

The new Geon insulation, which withstands oils and most chemicals at higher temperatures for longer periods than rubber, is used by Thermo Electric Co., Inc., on thermocouple lead wires, for a variety of pyrometric temperature measuring applications, testing aircraft engines, quick coupling panel plug leads, and for refrigerators and deep freezers.

Features of the Geon compound,



PROTECT METAL STRUCTURES POSITIVELY UNDER ALL CONDITIONS!

"NATIONAL" GROUND ANODES

● Regardless of what the job is . . . how corrosive the environment – whether wet or dry, hot or cold – you can depend upon "National" ground anodes to provide efficient, positive protection against underground and underwater corrosion.

"National" ground anodes have proved themselves in 20 years of successful operation in many different parts of the country. They outlast other materials by a wide margin. They do not have to be dug up and replaced every couple of years. Because they use a controllable current source, it is simple and economical to adjust their protective output to match exactly the requirements of any installation.

For complete details on "National" ground anodes, write to National Carbon Division, Union Carbide and Carbon Corporation, Dept. CI.

MORE THAN DOUBLE THE USABLE LIGHT!

The biggest news since the invention of flashlights—the brand new leakproof "Eveready" No. 1050 flashlight battery—gives more than double the usable brilliant white light for critical uses than any other flashlight battery we ever made.

NO METAL CAN TO LEAK OR CORRODE

The terms "National" and "Eveready" are registered trade-marks of

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30 East 42nd Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
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Both worth looking at-

INDONEX PLASTICIZERS

For Rubber, Synthetic Rubber, Asphaltic, and Resinous Compositions

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For Rubber Goods, Adhesives, Mastics, Paper Products, and Tape

Bulletin 12

INDOIL® CHEMICAL PRODUCTS

INDOIL CHEMICAL COMPANY
910 SO. MICHIGAN AVENUE • CHICAGO, ILLINOIS

known as Geon Plastic 8630, which make it satisfactory as insulation material for thermocouple lead wires, or other similar applications, include its excellent resistance to high temperature aging, good abrasion and deformation resistance, good flexibility at both high and low temperatures, and smooth, glossy surface which makes for attractive appearance and ease of handling.

The compound has been found to be non-corrosive toward copper, does not affect painted or varnished surfaces, and exhibits very good outdoor weathering charactertistics. Its high dielectric strength permits thinner insulation walls than are possible with other insulating materials.

In addition to its high temperature resistance, the new insulating compound has demonstrated its excellent low-temperature charactristics in sub-zero operations.

Geon 8630 has received Underwriters' Laboratories' approval for use as electrical tubing at 105°C, and for use as appliance wiring insulation at 90° and 105°C, such as radio and television hook-up wire.

Diallyl Amine

Highly reactive amine available in pilot-plant quantities.

Edwal Laboratories, Inc., Ringwood, Ill., is now making diallyl amine $(CH_2{:}CHCH_2)_2NH$, in pilot-plant quantities.

Diallyl amine has the following characteristics: mol. wt., 97; specific gr. 0.7854 at 25°C; R. I., 1.43 at 25°C; boiling range, 106°-108°C; sol. in water, 8% at 25°C; miscible with ethanol, ether, benzene and mineral oil; odor, fishy and ammonical; color, white.

The chemical properties are typical of secondary amines, highly reactive because of double bonds. Suggested uses are as a pharmaceutical and resin intermediate and in organic synthesis.

Sodium p-Chlorobenzenesulfonate

Hydrotropic agent with other useful properties offered for evaluation.

Pennsylvania Salt Manufacturing Co. is now offering for evaluation purposes sodium parachlorobenzenesulfonate monohydrate. This free-flowing coarsely crystalline, water-soluble compound has a molecular weight of 233 and is thermally stable except for loss of its water up to 300°C.

Tests at Pennsalt's Whitemarsh Research Laboratories show that concentrated solutions of sodium parachlorobenzenesulfonate increase the water solubility of materials such as aniline, cresol, and benzaldehyde. Further, the hydrotropic properties of this product have been shown to be more effective on a cost basis than other commercially available agents of the aryl sulfonate type.

Low-sudsing, 100%-active detergent for—

Commercial and home laundry compounds
Dishwashing compounds
Metal cleaning and treating
Paint and wall cleaners
Textile processing
Paste cleaners

Barrier creams
Preparation of nondusting detergent mixtures
Detergents for sanitation
Floor cleaners
Liquid detergents

STEROX CD

The following properties present a clearer picture of the values of STEROX CD — one of Monsanto's extensive line of synthetic detergents and wetting agents.

PROPERTIES OF STEROX CD

COMPOSITION . . . Sterox CD is a 100% active, nonionic-type of surface-active agent, emulsifier, and detergent.

APPEARANCE . . . Sterox CD is a pale yellow to light-amber colored liquid which has a mild, somewhat sweet fatty odor that is not objectionable and can easily be perfumed if desired.

PHYSICAL PROPERTIES . . . Sterox CD is a medium-viscosity liquid at room temperature, and has a pour point of approximately 50° F. Sterox CD is soluble or miscible with water in all proportions at room temperature.

CHEMICAL PROPERTIES . . . Sterox CD is chemically a polyoxyethylene ester, and this nonionic material, as contrasted to the more common anionic types, yields in solution substantially no ions subject to inactivation by water hardness. The inertness of this product to water hardness or metallic salts makes it economical to use by requiring only small amounts to be effective. There is no objectionable scum or curd formed in hard water.

FUNCTIONAL PROPERTIES . . . Sterox CD is designed to give very little suds and this property is valuable where minimum or controlled sudsing is required. Sterox CD has a high detersive efficiency over a wide range of concentrations and temperatures, in soft or hard water. Because of this and the other properties previously mentioned, Sterox CD is most generally useful in detergent compositions, for laundry operations, scouring applications in the textile field and general industrial cleaning. Many diversified fields are finding use for Sterox CD and many varied applications are possible for this versatile product. For example, the uses range from cosmetic preparations to metal cleaning.

COMPATIBILITY . . . Sterox CD is not only compatible with, but is frequently beneficially added to, anionic detergents, both synthetics and soaps. It is also compatible with the cationic-type detergents. Sterox CD is enhanced in efficiency by combination with alkaline "builder" materials such as phosphates, silicates and carbonates. Sterox CD is also effectively used with the acid-type cleaners. *Sterox: Reg. U. S. Pat. Off.*

Full data and sample of Sterox CD will be sent promptly upon request. Mail the coupon or contact the nearest Monsanto Sales Office.

MONSANTO CHEMICAL COMPANY, Phosphate Division, 1703-J South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

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MONSANTO CHEMICAL COMPANY
Phosphate Division
1703-J South Second Street, St. Louis 4, Missouri

Please send Sterox CD Technical Bulletin No. P-129 ☐, sample of Sterox CD ☐, prices on Sterox CD ☐.

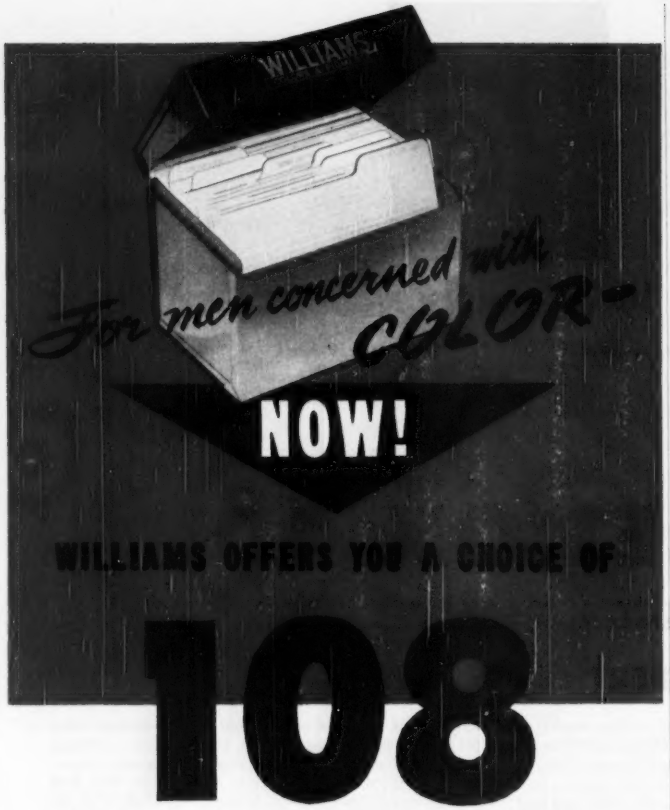
Name ..... *Title* .....

Company .....

Street .....

City ..... *Zone* .... *State* .....

SERVING INDUSTRY . . . WHICH SERVES MANKIND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The sodium salt through its action as a solubilizing agent and the free acid through its action as a catalyst should be useful in promoting esterification, dehydration and condensation-type reactions.

Laboratory investigation has indicated the following possible industrial applications for this product:

1. As a peptizing agent for casein, soya proteins and related materials in the manufacture of adhesives and plastics.
2. As an agent in pigment flushing, ore flotation, sensitizing and breaking of oil emulsions and as a solubilizing agent for certain dyes.
3. For raising the cloud points of non-ionic and anionic detergents in acid, caustic and alkaline salt solutions.
4. For the preparation of alkaline earth salts of parachlorobenzenesulfonic acid as crank case detergents.

Tests have indicated its further applications as an adjuvant in cleaning compositions, an air entraining agent in cements, and a chemical intermediate.

A bulletin describing in detail the possible applications and physical properties of sodium parachlorobenzenesulfonate has been prepared and will be sent upon request.

Inquiries regarding specific and potential applications and other information concerning sodium parachlorobenzenesulfonate monohydrate should be addressed to the Market Research Division of the company, 1000 Widener Bldg., Philadelphia 7, Pa.

Organizing Research

(Continued from page 404)

blocks of the research organization. If the number of groups is sufficiently large then it is obvious that having them all report to one supervisor would be too much of an administrative load on that one individual. It is then customary to sub-divide or to bunch the various groups roughly according to function and to have them respond to an assistant director of research, with the assistant directors of research responding to the director of research.

This discussion of the organization and functions of an industrial research laboratory started with an exposition of the function and was followed by a description of the individual requirements for personnel to fulfill these functions, with major emphasis being placed on group organization and on the group leader. As one progresses through an organization from group leader to assistant director to director of research, the amount of technical direction exercised diminishes. Technical responsibility rests most squarely on the individual actually doing the

KELCO ALGIN

● That's because Kelco Algin promotes better product appearance and performance — assures formula balance and pleasing uniformity of texture and suspension.

Used as a stabilizer, emulsifier, thickener and as a suspending, gel-producing and film-forming agent, Kelco Algin has proved its value in a wide variety of applications — for foodstuffs, pharmaceuticals, paperboard, textiles and in numerous industrial uses.

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PAPER COATINGS

SATURANTS

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BINDERS

Stable, fine particle size, alkaline dispersions of high styrene-butadiene copolymers characterized by excellent mechanical stability, good film-forming and anti-foaming qualities.

Excellent adhesion to concrete, wood, cloth or paper.

Adaptable for all types of paper coating operations.

Easily compounded and modified for emulsion paints. High pigment binding power.

Compatible with resins, oils, starches and pigments, as well as other latices.

These latices are not compounded GRS types, but are true copolymers produced by the American Polymer Corporation.

SPECIFICATIONS—POLYCO 350

Solids	45%
pH	8.5—9.5
Viscosity	20 cps a 25°C
Wt/gallon	8.49

Available in drums, carloads and tank cars. Ask for Data Sheet P-11.

POLYCO

AMERICAN POLYMER CORPORATION

PEABODY · MASSACHUSETTS

work. As one goes through the above progression, the responsibility more and more becomes one of personnel management and economic direction of the work, rather than of specific technical direction.

Research administration is responsible for the selection and supervision of personnel to carry out the work; but it is the individual chemist and engineer, working at the bench or in the plant, who, by his own capabilities, interest and enthusiasm, determines not only the course which the work will take technically, but even the detailed form of the organization.

Trademarks

(*Continued from page 445*)

borne infectious microbes. 575,000. Infectaside Co.

PAN AMERICAN. Plasticizers for use in the industrial arts. 576,220. Pan American Refining Corp.

AMOFLEX. Plasticizers for use in the industrial arts. 576,353. Pan American Refining Corp.

ODORSTROY. Chemical solutions containing metazene for eliminating offensive odors from the air. 583,185. American Instrument Co., Inc.

F-115. Monochloropentafluoroethane, being fluorinated hydrocarbons used as refrigerants, propellants and fire extinguishing preparations. 583,348. Kinetic Chemicals, Inc.

OCTALOX. Insecticides. 583,695. Julius Hyman & Co.

LAWN CARE. Fertilizers for farm, golf courses, and lawns. 559,947. O. M. Scott & Sons Co.

Cross Country. Fertilizers. 570,653. Sears, Roebuck and Co.

SUL-AMMO. Liquid ammonium bisulfite generally utilized as fertilizer and soil conditioner. 572,526. Stauffer Chemical Co.

TOMATOTONE. Synthetic plant hormones. 574,751. American Chemical Paint Co.

VISTAGREEN. Fertilizer. 574,883. Armour & Co.

ARMOGREEN. Fertilizer. 575,389. Armour & Co.

(Symbol) Potash used as a fertilizer. 578,469. U. S. Potash Co.

KAPOST. Organic compost. 585,331. Kalin Compost Co.

ROSE VALLEY. Enriched fertilized top soil used as a plant food. 588,488. Grocery Store Products Co.

TUTCH-UPP. Kit containing abrasive powder, polishing pad, and colored and transparent oils for removing scratches and blemishes from surface of furniture. 539,680. Dryburgh & Sons, Inc.

LUSTERBRITE. Dishwashing compounds and cleansers for hand or machine use in powder or granular form. 568,707. Apothecaries Hall Co.

PERT. Liquid chemical product for use as a cleaning fluid for fabrics. 571,847. Diversey Corp.

PO-QUAT. Cleansing and sanitizing preparation containing quaternary ammonium compound as active ingredient for cleansing and sanitizing milking machines, etc., food containers and utensils, and eating utensils. 572,314. Milk Plant Specialties Corp.

ON-OFF RUB ON-WIPE OFF. Waterless cleaner for the hands and automobiles. 572,627. Amalgamated Sales.

QUAT SHOTS. Water soluble detergent compounds sold in cake and powder form and adapted for use in mechanical dishwashing as an alkalizing agent. 572,919. Quatomatic, Inc.

KAYLORITE. Fertilizers. 588,220. Harry W. Kaylor.

BRIDGEOVER. Solvent solution of a resinous material used for coating open weave, foraminous or apertured surfaces or open areas in surfaces. 496,770. Eronel Industries.

STAYS-IN. Laundry Starch. 525,822. National Textile & Chemical Lab.

Beu-Tress. Shampoos. 575,663. New York Hair Co., Inc.

ESCO. Oil base paints in ready-mixed form, and painters' materials. 505,516. Preservative Products Co.

MULE-HIDE "NOT A KICK IN A MILLION FEET". Ready mixed and paste paints. 520,728. Lehon Co.

SUAVITOR. Substance composed of insoluble metals and metal oxides which hastens ageing or mellowing processes of alcoholic liquors. The substance also has bacteriostatic and fungistatic properties. 549,031. Ward Blenkinsop & Co., Ltd.

$C_6H_5CH_2CL$
BENZYL CHLORIDE
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Careful selection of raw materials and rigid quality control at each stage of processing is the way to manufacture fine chemicals. That's what we do at Tennessee.

By owning and managing our own source of raw material supply, we have an efficiently integrated production and exacting quality control. You benefit by the finest of service, the best possible quality of product.

Tell us your specific needs. See how we are able to satisfy so many particular customers. Place an order now for chemicals from Tennessee.

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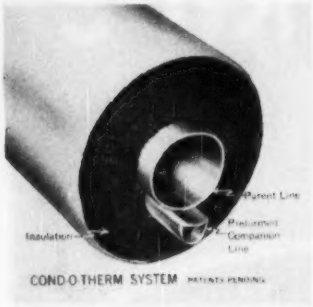
NEW EQUIPMENT

Process Line Heater

New companion line provides increased heat transfer surface.

Pre-determined temperatures in process lines are maintained by providing a preformed, extruded companion line with substantial surface-area contact on the parent line.



The companion lines, produced by Cond-O-Therm, 18 Littleton Ave., Newark, N. J., can be preformed from tubing of copper, monel, stainless steel or any metal required for the process. They can be furnished in multiples so that the parent line can, if necessary, be entirely clustered to maintain extremely high or low temperatures.

The parent line can be of welded, sweated or flanged construction. One end of each length of companion line has a special extruded neck to provide a slip fit over the end of the next length, making it possible to silver solder or braze the joints in assembly.

Proportioning Valve

Any type of geometric figure can be supplied in new type proportioning valve to give desired characteristics.

A new automatic control valve has been developed by W. S .Rockwell Co., 200 Eliot St., Fairfield, Conn., for pipe lines and equipment handling fluids which require straight line proportional flow characteristics and minimum pressure drop and turbulence.

Employing the design of a slide valve, the valve opening is rectangular in shape so that the slide or gate is moved over it, the flow is directly proportional to the open area. If desired, the opening can be designed to conform to any other geometric figure to provide the kind of flow curve required, having either an increasing or decreasing open area.

The valve body can be made of cast iron, cast steel, stainless steel or bronze, while the internal working parts are of stainless steel. The valve is built for pipe openings from ¼″ to 2″, and for pressures to 300 psi. The straight up-and-down valve motion is controlled by a stem which may be connected to a hand lever or automatic control mechanism.

Liquid Measurement

New system provides pushbutton control of repetitive deliveries of predetermined quantities of liquids.

An important new system for accurate automatic liquid measurement has just been announced. The new Electrivolume control system of Buffalo Meter Co., 2917 Main St,. Buffalo, N. Y., provides controlled deliveries of predetermined liquid quantities.

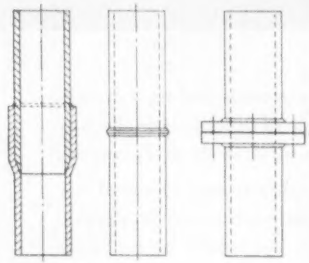
The measuring is performed by a Niagara Electricontact meter, built for whatever liquid is being used.

Upon delivery of each unit of liquid, the meter generates an electric impulse which is transmitted to an impulse counter which accumulates the impulses up to the predetermined and preset number. When this is reached, the impulse counter actuates another electric circuit which shuts a solenoid valve, and simultaneously recycles itself back to zero ready for the next run.

Polythene Ducts

Four-foot lengths of polythene duct work available.

American Agile Corp., 5806 Hough Ave., Cleveland 3, O., can now furnish Agiline acid and alkali proof duct lines of natural or colored polythene plastic tubing. Diameters range from 2″ to 36″. The joints are very easily



sealed if the first 5″ of tubing after chamfering is immersed in water that has been heated to 200°F. The cold end of the other 4′ length can be inserted into the heated, highly flexible end of the next tubular unit as shown on the diagram. The resulting joint, when cooled at air temperature, becomes sealed to the escape of air, fumes and liquid. The same "hot water" treatment can be applied to the forming of curves and near angles. Other connections are made by welding or flanging. Agiline plastic duct lines are *not* recommended for temperatures above 150°F. nor where acetic acid, benzene, bromine, carbon tetrachloride, chlorine, ethylene, dichloride, gin, iodine, gasoline, trichlorethylene, vegetable and animal oils and whiskey are used.

Ball Mill Media

New media grinds 83% more material than porcelain balls in same time.

The U. S. Stoneware Co., Akron, O., has developed "Borundum," a new non-metallic ball mill grinding medium resembling synthetic sapphire in composition.

"Borundum" grinding media weigh 75-80% more and are up to 50% harder, than porcelain balls or flint pebbles. Their unique tubular shape provides greater contact area. Their relatively smaller size (13/16″ OD by 13/16″ long) was selected after lengthy tests as the most effective size for both large and small capacity mills.

Brazing Alloy

New alloy provides brazed joints for stainless steel with strength equal to parent metal up to 2000°F.

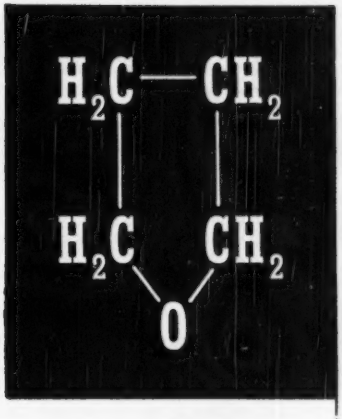
Nicrobraz, produced by Wall Colmonoy Corp., 19345, John R St., Detroit 3, Mich., is a heat and corrosion resistant alloy for brazing stainless steels. A joint of a stainless steel assembly brazed with Nicrobraz equals the strength of the parent metal at 2000°F. and has better corrosion and oxidation resistance. It can be used to braze 300 and 400 series stainless steel, Inconel, S-590, Monel, alloy steels, tool steels, carbon steels, and special stainless steels.

An assembly to be brazed with Nicrobraz is prepared the same as for copper brazing. Joint clearance should not be over .002″ where highest quality joints are desired. As stainless steels oxidize in regular brazing furnace atmospheres, brazing is best accomplished in pure dry hydrogen of —40°F. dew point or below.

Control Drive

New control drive can be fitted to requirements of a given process now available.

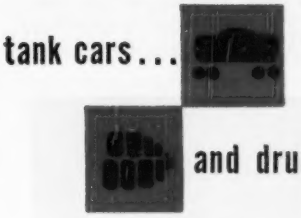
A characterized control drive which can be fitted to the requirements of a special application is the latest develop-



DU PONT
TETRAHYDROFURAN

powerful solvent for high molecular weight polyvinyl chloride and vinylidene chloride copolymers

AVAILABLE IN COMMERCIAL QUANTITIES



PHYSICAL PROPERTIES

Appearance	Colorless, mobile liquid
Odor	Ether-like
Molecular Weight	72.10
Boiling Range @ 760 mm.	65-67°C.
Specific Gravity, 20/4	0.887
Index of Refraction, N20/D	1.407
Flash Point	−17°C.
Vapor Pressure @ 25°C.	176 mm.
45°C.	385 mm.
65°C.	760 mm.
Solubility	Miscible with water and most common organic solvents.

TETRAHYDROFURAN is an excellent solvent for difficultly soluble organic materials such as high molecular weight polyvinyl chloride and vinylidene chloride copolymers, yielding solutions of high solids contents at practical working viscosities. In view of the low boiling point of TETRAHYDROFURAN (66°C.), films of polyvinyl chloride cast from TETRAHYDROFURAN solutions dry rapidly with only a slight forced draft, and no solvent odor is retained.

TETRAHYDROFURAN WITH OTHER SOLVENTS . . . TETRAHYDROFURAN can be used in conjuction with other solvents such as methyl ethyl ketone and toluene. It has been found that clear films can be cast from 10 to 15 per cent solutions of high molecular weight polyvinyl chloride in a 65/35 mixture of TETRAHYDROFURAN with methyl ethyl ketone and also in a 75/15/10 mixture of TETRAHYDROFURAN, methyl ethyl ketone, and toluene. The solutions should be prepared by first dispersing the resin in TETRAHYDROFURAN with good agitation, then adding the methyl ethyl ketone and, finally, the toluene.

TETRAHYDROFURAN IN ADHESIVES . . . TETRAHYDROFURAN is used in the formulation of adhesive compositions for plastics and films. Solutions of TETRAHYDROFURAN containing about 10 per cent "Saran" polyvinylidene chloride have been used effectively to seal "Saran" polyvinylidene chloride sheets and bags. Also, a 10 per cent solution of polyvinyl chloride in TETRAHYDROFURAN is an effective adhesive for polyvinyl chloride sheets.

TETRAHYDROFURAN/WATER MIXTURES AS SOLVENTS FOR CELLULOSE ACETATE AND ALKALOIDS . . . TETRAHYDROFURAN is miscible with water and forms a constant boiling mixture with 4.3 per cent water. This mixture is a better solvent than TETRAHYDROFURAN alone for certain materials such as cellulose acetate. Mixtures of TETRAHYDROFURAN and water are more effective solvents for alkaloids such as caffeine than either TETRAHYDROFURAN or water alone.

SOLVENT FOR CHEMICAL REACTIONS . . . TETRAHYDROFURAN is an excellent medium in which to carry out Grignard reactions. It is also a good solvent medium for lithium aluminum hydride and sodium acetylide reactions. Its ether structure and the extraordinarily wide range of organic materials which it dissolves suggest its use as a medium for other chemical reactions.

AS A CHEMICAL INTERMEDIATE . . . TETRAHYDROFURAN reacts by substitution and fissure of the ring. Among these reactions are dehydration, oxidation, chlorination, and acylation.

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ment of Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O. The new control drive, consists of a double acting air cylinder (with rigid supporting stand and enclosure) a positioning relay, and a manual operating wheel or lever.

The positioning relay provides the characterizing feature. It incorporates a cam whose shape determines the

relation of control drive position to control loading pressure. Three cams are included with each drive and may be used interchangeably to obtain positions which are proportional to the first power (straight line), square, or square root of the control loading pressure. For applications where special relationships are required any one of the three basic cam shapes may be modified easily.

The drive requires only 0.10 psi change in control loading pressure to deliver full supply pressure to the piston in the air cylinder. It has unusual flexibility; reaction to increased control pressure may be completely reversed by three simple adjustments, and drive travel and loading pressure range can be changed easily and quickly.

Manual operation is simplified by an air supply shut-off valve, a by-pass valve, a hand lever or wheel, and a clamping device.

Check Valve

New check valve for glass manometer lines is all glass.

An all-glass overflow check valve to prevent loss of indicating gage or manometer liquid due to surge pressures is announced by King Engineering Corp., Box 300, Ann Arbor, Mich., for hydrostatic instruments of all kinds.

Known as the King glass tube overflow check valve, this unit (pat. appl. for) consists of a glass float check in a glass cylinder. The cylinder has a seat at the top opening, and a glass tube below to connect to the instrument. The mating surfaces of the float and cylinder are ground and lapped to a perfect fit, and the indicating liquid in the instrument will wet the seat and form a liquid seal. When excessive or surge pressures occur, the float rises instantly to form a perfect seal.

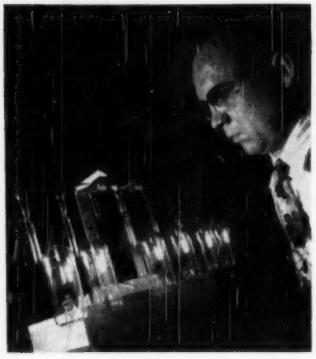
Since this check valve is made entirely of transparent glass, operation can be readily observed; and dirt on the seat can be detected before it causes leakage.

Standard dimensions are 7/16″ maximum OD and 6″ over-all height, with glass connecting tube of 7 mm. OD. Check valves of other dimensions can be furnished to meet special requirements.

Vacuum Gage

New highly sensitive vacuum gage developed.

An electronic pressure-gauge 200 times more sensitive than any ever produced before is being produced by the Westinghouse Electric Corp., 306 4th Ave., Pittsburgh 30, Pa. The new



ion gauge can detect the presence of air in a vacuum where only one air molecule remains out of every 10,000 billion originally present.

To measure the pressure in a vacuum, the gage is sealed tight to the system, the power turned on and electrons released, just as in a radio tube.

When these electrons collide with air molecules in their path, they create a positively charged ion. The number of ions formed each second is an accurate measure of the pressure inside the vacuum system. Previous ion gages were limited in their sensitivity because of false reading produced by x-rays inside the gage.

Pump

New pump has all parts normally subject to maintenance contained in removable rotor assembly.

De Laval Steam Turbine Co., Trenton, N. J., is producing a new line of small general service centrifugal pumps.

The new Type GS pumps have all parts except the bare pump casing in the rotor assembly. For maintenance the top cover and end plate studs are

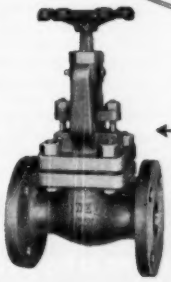
The exteriors may look alike—but *what a difference inside!*

Inside one home, life goes on smoothly and harmoniously. But in the house next door there's constant friction and nerve-wearing turmoil.

Compare the outside appearance of any standard Powell valve with that of any other valve of the same type and size. You will probably notice very little difference. But inside—that's another story.

There design, materials and manufacturing skills make the difference between a Powell Valve—built to operate smoothly and efficiently over a long period of time—and a valve that will have only a short life before it requires maintenance or even replacement.

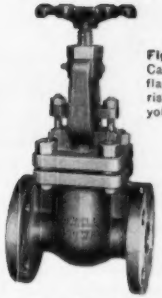
Powell also makes many *exclusive* patterns to meet the requirements of special services. In these, too, long trouble-free performance is a primary consideration.



← Flanged End O. S. & Y. Globe Valve. 150 pounds W. P. Face-to-face dimension conforms to MSS SP42. **Fig. 2475**—Available in 18-8S, 18-8S Mo, Durimet "20". **Fig. 2477**—Available in Nickel, Monel Metal, Ampco Alloys, Everdur, Hastelloy Alloys A-B-C-D. Also made with Screwed Ends.

Fig. 559 — 125-pound Iron Body Bronze Mounted Swing Check Valve with flanged ends, bolted flanged cap and regrindable, renewable bronze seat and disc.

Powell Flush Bottom Tank Valve. Made in two designs: **Fig. 2309,** in which disc rises into tank to open valve; **Fig. 2310,** in which disc lowers into body of valve.



Flanged End O. S. & Y. Gate Valve. 150 pounds W. P. Face-to-face dimension conforms to MSS SP42. **Figs. 2471** (Solid Wedge) and **2486** (Double Wedge) available in 18-8S, 18-8S Mo, Durimet "20." **Figs. 2473** (Solid Wedge) and **2488** (Double Wedge) available in Nickel, Monel Metal, Ampco Alloys, Everdur, Hastelloy Alloys A-B-C-D. Also made with Screwed Ends.

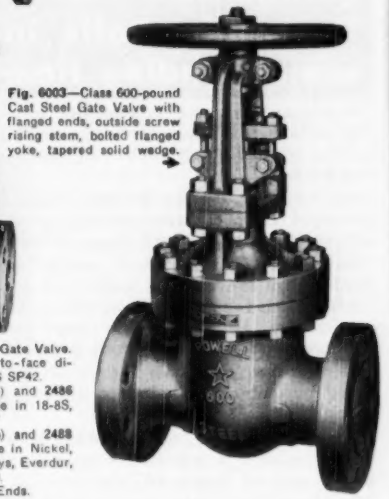
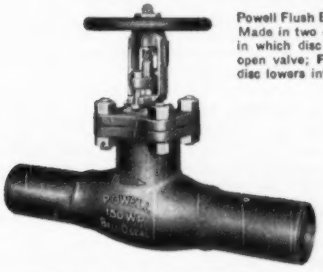


Fig. 6003—Class 600-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge. →



Bell-O-Seal O. S. & Y. Globe Valve. Welding ends. For handling hazardous fluids; for high vacuum service; or for use where a packless valve is needed. Also available with screwed or flanged ends, and in Angle and "Y" patterns. Can be furnished in various corrosion-resisting metals and alloys.

Fig. 2608— Bronze Globe Throttling Valve with full flow through the seat when wide open. Special bronze stem and stainless steel seat and disc hardened to approximately 500 Brinell.

The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief, and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.

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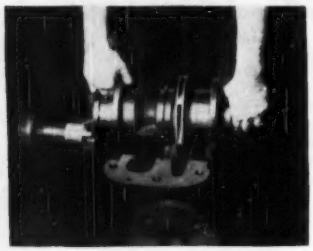
POWELL VALVES

removed, the assembly lifted out and a new assembly dropped into place. The old rotor can be returned to the factory for rebuilding where full credit



is given on all usable parts. Or the customer can repair the rotor assembly in his own shops.

Mechanical seals eliminate the stuffing box and the bearings are lubricated for life. The pump case and cover are iron, the impeller is bronze, and the shaft is stainless steel.

The new pump is built in three sizes for capacities to 450 gpm with heads to 230'.

• John Dusenbery Co., Inc., 271 Grove Ave., Verona, N. J., has a new line of midget hydraulic pumping units, available with a 5 pt. or a 3 gal. capacity reservoir.

The reservoir is mounted on either an open, a totally enclosed, or an explosion-proof motor, and the pump, check valve, and relief valve are enclosed. Both reservoir and bulkhead are made of aluminum, and units with open motors have aluminum motor frames. Pressure and return line connections are for ⅜ OD flared tubing, but ¼" pipe thread or ¼" hose coupling connections. Output ranges from 0.1 gpm to 2.8 gpm.

• Conductivity cells with fittings for mounting in 1" sanitary pipe lines are available from Industrial Instruments, Inc., 17 Pollock Ave., Jersey City, N. J. The cell consists of a pyrex glass mounted in a shielded type 316 stainless steel fitting.

• Jenkins Bros., 100 Park Ave., New York 17, N. Y., have introduced a new rapid-action, bronze **lever gate valve,** the Swingtite. It has ball and socket design double discs which adjust readily to seat surfaces. Guide rims on these discs rotate freely on the guide tracks cast in the body, as the valve opens or closes.

The Swingtite is rated for 125 psi steam service, 300 psi cold oil, water, and gas, and is made in ½" to 2" sizes.

• A new type of **3-way fog nozzle** that will extinguish oil, electrical and other types of fires with low water consumption is being produced by Bete Fog Nozzle, Inc., Greenfield, Mass. It can be changed from full fog to

straight stream to complete shut-off by a turn of the handle.

A patented spiral tip and unique movable core make it self-cleaning and practically non-clogging.

The new Bete G-5 nozzle can be operated on any pressure from 30 to 150 psi—using at 100 psi about 8 gpm for fog and 10 gpm for straight stream. It is regularly furnished with a standard "garden hose" thread, and is made of polished stainless steel and chrome-plated brass.

• The Wm. Powell Co., Cincinnati 22, O., is producing a new line of small size, high pressure, **cast steel valves,** available in globe, angle and "Y" patterns, Classes 1500 and 2500 pounds, in sizes ½" to 2", inclusive, and have socket well ends. They are known as integral bonnet valves as the one-piece construction of the body and bonnet, eliminates the body-bonnet joint and all possibility of leakage at this point.

• A new 200-pound "W.S." **globe valve** is announced by the Wm. Powell Co., 2503-31 Spring Grove Ave., Cincinnati 22, O. The outstanding features are the high lift of the disc, the large flow areas above and below the seat, and the wide nominal pipe size opening through the seat. Advantages that result are full flow through the seat when the valve is fully open, turbulence is practically eliminated, while

Amazing new development grinds 83% more material than Porcelain Balls in same grinding time

"Borundum" is a new non-metallic grinding medium. It is heavy, hard and extremely tough, resembling synthetic sapphire in composition.

In ball milling, weight, hardness, shape and size of grinding media are principal factors affecting grinding speed. Toughness and wear-resistance are major in limiting mill charge contamination from media "wear-off."

"Borundum" Grinding Media weigh 75-80% more, and are up to 50% harder, than conventional media such as porcelain balls or flint pebbles. Their unique tubular shape provides greater contact area. Their relatively smaller size ($\frac{13}{16}$" O.D. by $\frac{13}{16}$" long) was selected after lengthy tests as the most effective size for both large and small capacity mills.

The comparative test data in the chart indicates not only greater grinding speed but substantially longer life and infinitely less mill charge contamination.

"Borundum's" dense, non-absorbent body and its white, smooth, easily washed surface permit its use interchangeably in grinding various materials without danger of inter-material contamination.

Would you like to examine samples of our "Borundum" Grinding Media? Write Dept. CHI 950 Process equipment Division.

COMPARATIVE TEST DATA

	Porcelain Balls	"Borundum" Media
DURABILITY: Loss of weight in grinding media after 24 hrs. grinding of Fused Silica, 24-40 Mesh Grain Size	0.74%	0.16%
CONTAMINATION of CHARGE: Increase in weight of above mill charge after 4 hours grinding time	2.20%*	0.00%**
PERFORMANCE: % of above mill charge reduced to pass through 100 mesh screen, 4 hrs. grinding time	30.00%	55.00%

* This increase in weight of the mill charge after grinding represents material ground off the porcelain balls and incorporated as contamination in the mill charge.
** Almost zero, but extremely difficult to measure.

U. S. STONEWARE
Akron 9, Ohio

pressure drop is cut to the minimum. Renewable, regrindable cone-shaped discs and seats are of stainless steel hardened for maximum erosion resistance. Valves are available with screwed ends, and in sizes from ⅛" to 3", inclusive.

• High impact resistance is built into a new 12-ounce aircraft grade aluminum alloy **safety hat** produced by E. D. Bullard Co., 275 8th St., San Francisco 3, Calif. Distinctive ribbed design, furnish ample structural strength while the crown remains resilient to absorb much of the impact of a falling object. The inner hat assembly is designed to absorb shock with its full-floating, six-point suspension hammock. Headbands and hammocks are fully adjustable to fit all head shapes and sizes. The entire assembly can be replaced without tools with slide action wedge type fasteners.

• A new monitor for checking all types of electro-magnetic radiation is available from Nuclear Instrument and Chem. Corp., 229 W. Erie St., Chicago 10, Ill. Designated Model 2611, this new **count rate meter** is battery operated and uses a thin mica end window probe with the density of only 1.4 milligrams per square centimeter. This window is roughly equivalent to 1½ centimeters of air and the instrument may, therefore, be used for monitoring alphas as well as betas and gamma rays.

• A new line of self-priming **centrifugal pumps** is being produced by Gilbert & Barker Mfg. Co., Springfield, Mass. The new Roto-Prime pumps act as a positive displacement pump when priming is required. The new pumps, of single-stage, single-suction volute type, have no priming reservoir. Self-priming is accomplished by a small variable capacity, vane type 1750 RPM positive displacement pump which is mounted inside the main pump housing and is directly connected to the main shaft. When there is loss of suction due to air or vapor the priming pump automatically goes into action and removes the air and vapor from the pumping system. When the main centrifugal pump is in full operation and the piping system is filled with liquid the priming pump is in neutral position. Capacities available range from 50 to 450 gpm.

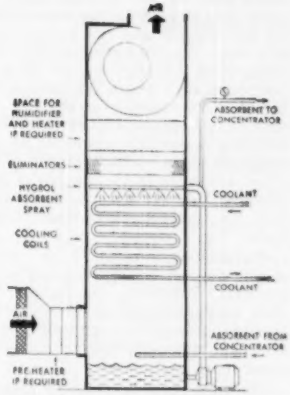
• Hot rolled **Inconel** in equal **"T" sections** is available from the International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. The "T" sections are made in a standard size 1½ x 1½ by ¼", and in lengths up to 15'. The weight is approximately 2¾ pounds a foot.

How You Save with the NEW Niagara Method of Air Conditioning

Using "Hygrol" Hygienic Absorbent Liquid

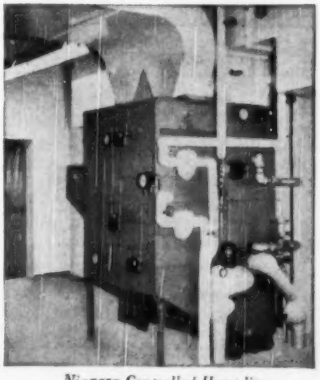
Because it absorbs moisture from the air directly, the new Niagara Controlled Humidity Method uses less, or no, mechanical refrigeration for dehumidifying. You save first costs and installing of heavy machinery. You save space, maintenance expense, power. You get easier, more convenient operation.

Using "Hygrol" hygienic absorbent liquid, this method gives complete control of temperature and relative humidity. Especially, it is a better way to obtain dry air for drying processes, packaging hygroscopic materials, preventing moisture damage to metals, and obtaining better quality for chemical process products and food products—or in obtaining better results in comfort air conditioning for office or laboratory at lower refrigeration costs.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

Food Packaging under Controlled Humidity


Niagara Controlled Humidity Air Conditioner

The diagram shows how filtered air is dehumidified by passing thru a spray of "Hygrol"—a liquid absorbent which removes air-borne moisture. This liquid is hygienic and non-corrosive; it contains no salts or solids to precipitate and cause maintenance troubles. It is continuously re-concentrated at the same rate at which it absorbs moisture, providing always the full capacity of the air conditioner, automatically.

Units provide a range of capacities from 1000 to 20,000 C. F. M. Multiple unit installations are in use successfully. Records of results are available. For further information, write Niagara Blower Co., Dept. CI 405 Lexington Ave., New York 17, N. Y.

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Shipping Losses Lower, Bureau Report Shows

The total property loss for last year chargeable to the transportation of explosives and other dangerous articles by rail freight and rail express was less than that reported in any year since 1940, and the number of accidents and fires which occurred established a low record for the last ten years. This record of achievement in handling hazardous materials is the highlight of the Annual Report of the Chief Inspector of the Bureau of Explosives, the agency concerned with safe rail transportation of such materials.

No persons were killed or injured due to the rail transportation of commercial explosives, concluding the 28th consecutive year in which no explosions occurred in connection with the rail transportation of Class A commercial explosives.

The total reported property loss resulting from the transportation of explosives of all kinds, wherein functioning of the contents of containers occurred was $36. Considering that published data show that there were more than 596,910,000 pounds of commercial explosives produced in the United States during 1949, this record of safety is most remarkable.

Although the report contains nine tables summarizing accidents and fires in different categories, only two of the tables are of primary interest to all shippers of hazardous materials and are reproduced here. Table No. I lists the number of accidents and the resulting property loss according to the principal causes, for each class of dangerous articles. Table No. II is a summary of all accidents reported during the year involving explosives and other dangerous articles showing the number of fires, explosions, fatalities, injuries to persons and amount of property loss in each classification.

During 1949, 245 amendments to the regulations for the transportation of explosives and other dangerous articles were submitted to the Interstate Commerce Commission and were approved and published. A majority of these amendments were necessary in order to provide for the safe transportation of new chemicals or products, or to permit the use of additional or improved types of containers, or improved methods of container manufacture. The year brought better conditions with regard to container availability than have been experienced since the war, but there was still an early shortage of containers.

In concluding his report, H. A. Campbell, chief inspector, acknowledges the help received from various agencies as follows:

"The staff of the Bureau has continued to receive the valued assistance of the Agricultural Fungicide Association, American Petroleum Institute, the Chlorine Institute, the Compressed Gas Association, the Fibre Box Association, the Institute of Makers of Explosives, the Manufacturing Chemists' Association, and the Steel Shipping Container Institute, Inc., and their efforts are gratefully acknowledged. Our work also has been aided by our Affiliate Members and the many shippers and container manufacturers who continue to strive to make each year a safer year in the transportation of dangerous goods.

"The Interstate Commerce Commission, the Board of Transport Commissioners for Canada, and the United States Coast Guard have continued their cooperation with the Bureau staff in our efforts to provide the best practicable means of assuring safety in the transportation of the ever increasing number of dangerous articles which are being shipped."

Shippers May Still Reuse Single-Trip Metal Drums

Shippers who were originally notified that permission to reuse single-trip metal drums would be cancelled August 31, now may continue to reuse such containers indefinitely. This action by the Interstate Commerce Commission was taken in view of the impending steel shortage resulting from the arms program. The ICC has withdrawn from its Docket Notice No. 3666 dated July 7, 1950 the item cancelling the authority for the Bureau of Explosives to authorize the reuse of

TABLE NO. II—SUMMARY SHOWING RAILWAY TRANSPORTATION LOSSES CHARGABLE TO EXPLOSIVES AND OTHER DANGEROUS ARTICLES, 1949

Class	*No. of Instances*	*Fires*	*Explosions*	*Persons Killed*	*Persons Injured*	*Property Loss*	*Per Cent of Total Property Loss*
Explosives	21	0	2	0	1	$ 3,169	1.625
Acids and CorrosiveLiquids	267	11	0	0	6	26,231	13.451
Inflammable Liquids	215	7	0	0	1	120,511	61.795
Inflammable Solids and Oxidizing Materials	48	39	0	0	0	27,182	13.938
Compressed Gases	42	2	0	0	4	16,470	8.445
Poisonous Liquids and Solids	13	0	0	0	1	1,432	0.734
Forbidden Articles	1	0	1	0	3	25	0.012
Totals	607	59	3	0	16	$ 195,020	
Totals 1948	783	68	1	0	24	$ 943,736	
Totals 1947	822	88	6	0	38	372,559	
Totals 1946	1,006	127	5	0	58	417,984	
Totals 1945	1,185	165	1	1	20	625,812	
Totals 1944	1,202	134	2	2	42	779,136	
Totals 1943	1,148	94	13	6	64	1,240,374	
Totals 1942	1,293	96	2	6	37	604,093	
Totals 1941	849	82	0	3	16	305,552	
Totals 1940	840	69	3	2	74	143,051	
Totals 1939	868	74	6	3	22	115,526	

TABLE NO. I—DISTRIBUTION OF PROPERTY LOSS (RAIL FREIGHT AND RAIL EXPRESS), ACCORDING TO PRINCIPAL CAUSES OF ACCIDENTS*, 1949

Class	*Negligence of Employe*		*Rough Handling*		*Improper Packing*		*Improper Loading or Defective Container*		*Derailment or Collision*		*Spontaneous Heating or Excessive Sensitivity, etc.*		*Miscellaneous or Unknown*	
	No. of Instances	*Loss*	*No. of Instances*	*Loss*	*No. of Instances*	*Loss*	*No. of Instances*	*Loss*	*No. of Instances*	*Loss*	*No. of Instances*	*Loss*	*No. of Instances*	*Loss*
Explosives	0	0	10	$ 136	4	$ 13	6	$ 20	1	$ 3,000	0	$ 0	0	$ 0
Acids and Corrosive Liquids	41	572	32	4,045	21	348	138	14,582	4	5,628	0	0	31	1,056
Inflammable Liquids	60	1,551	6	488	1	1	127	8,174	13	99,841	0	0	8	10,456
Inflammable Solids and Oxidizing Materials	5	15	3	2,947	1	1	19	6,179	1	75	17	12,711	2	5,254
Compressed Gases	32	2,069	1	14,000	0	0	7	360	1	40	0	0	1	1
Poisonous Liquids and Solids	0	0	1	75	2	8	9	1,199	1	150	0	0	0	0
Forbidden Articles	0	0	0	0	1	25	0	0	0	0	0	0	0	0
	138	$ 4,207	53	$21,691	30	$ 396	306	$30,514	21	$108,734	17	$12,711	42	$16,767
Total Number of Accidents	607						Total Loss							$195,020

NOTE: The available reports were apportioned among the above causes of accidents on the following basis:
Negligence of Employes covers negligence on the part of any one having to do with the shipment, whether shipper or railroad employe.
Rough Handling covers cases definitely so reported or in which bracing was broken down or lading badly shifted.
Improper Packing covers shipments offered for transportation not packed in compliance with the I.C.C. Regulations.
A charge was made against Improper Loading or Defective Container only where such reason for accident could be inferred definitely from the report.
Collisions do not include cases of cars being bumped together; in switching, these cases being included under Rough Handling.
Under Miscellaneous are included all not otherwise listed causes, such as hot loading, sparks, fire from adjacent property, etc.
*The term "accidents" includes leakage from containers, broken packages, etc.

CHEMICALS COST LESS

→ TO PACK

→ TO SHIP

→ TO STORE

IN ST. REGIS

MULTIWALL

PAPER BAGS

It's a fact! Manufacturers of many chemical products report significant savings after switching to these strong, lightweight, low-cost containers.

↓

The reason is simple! St. Regis Multiwall Paper Bags cut labor and container costs. They're easier to pack, take less space to store. Freight charges are less, too, because Multiwalls mean lower container tare-weight. St. Regis Multiwall Paper Bags are durable . . . protect your product . . . are the most practical, most economical containers for *you* to use.

↓

St. Regis has developed St. Regis* Packaging Machines for high-speed packing of Multiwalls. Here's the packaging team to boost production, cut operating costs. Your nearest St. Regis Sales Office will gladly give you details on the adaptability of Multiwalls for your chemical products.

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In announcing the action of the ICC, H. A. Campbell, chief inspector, Bureau of Explosives, cautioned that in extending the expiration date of the permission to reuse such containers, it was understood that all drums reused under the provisions of this permit will be subject to all original requirements.

Drug Companies Report on Screw Cap Closures

A study of the special problems connected with screw cap closures in the drug and pharmaceutical industry has just been distributed to the interested members of the Packaging Institute, according to H. Earl Nack of Sharp and Dohme, Chairman of the Institute's Drug and Pharmaceutical Packaging Development Committee. Carl B. Burnside of Eli Lilly & Co. was in active charge of the study in which 34 companies participated by reporting their practices. It is available for $1.50 a copy.

For volatile liquids the report shows that Vinylite was the most popular facing, closure liners of Foil, Saran and Pliofilm being the second choices. Foil, however, takes first place where special closures are used for chloroform-containing liquids but, oddly enough, some concerns feel that no special precautions are needed. Where volatile oils, essential oils and organic solvents are packaged, foil is again the first choice for a liner facing.

Corrosion of metal caps is always a problem, but no one reported any comparable difficulties with molded plastic screw caps.

Eight different types of special closures were used by seventeen different companies for antibiotics and similar hygroscopic dry materials, with the majority exercising considerable control over screw cap application and torque.

Moisture vapor transfer data pertaining to liner facing were used by the majority of the companies reporting on this phase of the problem but most users rely on the cap manufacturer's data instead of measuring it in their own laboratories.

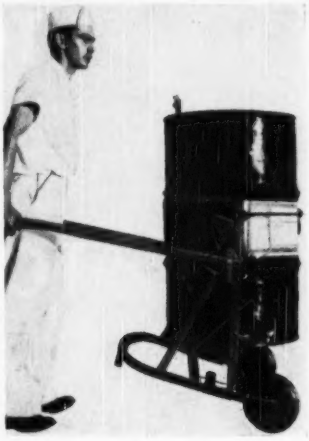
In spite of the functional need for high resilience of cap liners, upward of 80 per cent of the users do no testing of cork or pulp liners, but those who make such tests are very exacting in their requirements.

Testing of the breakage strength of plastic closures, by hand and by machine, and the frequency of such tests is indicaitve of a trend toward greater care in this field.

One of the more interesting aspects of the report is the survey of the methods and duration of tests of new closures, for some tests run as long as 8-12 weeks under accelerating conditions or 1 year under room conditions.

Portable Drum Rack

A new device said to cut time and labor costs in materials handling is the Penco Drum Rack recently developed by Penco Engineering Co., 725 Second St., San Francisco 7, Cal. These drum racks in both portable and stationary models have many unique features about them, principally the "tilt n' lock" feature which assures easy tilting and positive locking in any position for easy drum accessibility and maximum drum drainage. The drums are held secure to the rack by positive toggle locks and a strong steel retaining band. Both models are steady, all-steel welded construction designed for 50 to 55 gallon drum capacity.



The portable model is equipped with rubber tired wheels and is designed for perfect balance and fast handling of drums. In lifting and transporting, the center of gravity is almost directly over the wheels, permitting the operator to keep full-load control at all times with complete safety. The portable weighs 72 pounds, is 45" high with drum upright, and required only 31" x 35" floor space. The stationary models are practically the same as the portable model, except for maneuverability and a total weight of 41 pounds.

Packaging Group Revamps Program in Crisis

The military situation in Korea and its possible future expansion has forced the program committee of the Packaging Institute to revamp its original plans for the program of the 12th

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Annual Forum of the organization to be held at the Hotel Commodore, New York, N. Y., October 23, 24, 25, 1950. Accordingly, the forthcoming program of the Annual Forum will be partly devoted to the packaging problems arising from a national emergency and partly devoted to the normal problems of packaging for civilian life.

Plans for the first day of the convention call for a review of the packaging problems facing the members of Packaging Institute as a result of the war-time demands. One session is scheduled to include a government representative to discuss the methods of military procurement as they affect packaging. Also a spokesman from the packaging field is to tell the government what industry needs from government in order that industry may supply the government needs. In particular, it is hoped, the government agencies will handle the situation so that industry representatives will know where to go to get approvals of performance of packaging materials and finished packages where military orders are involved.

Another aspect to be covered is the manner in which the National Security Resources Board is planning to handle packaging for civilian needs and to coordinate civilian packaging with the military demands, for already reports are current of scarcities of sheet steel and aluminum, of rubber and plastics. It is obvious that military needs must come first but it should be equally obvious that adequate planning must endeavor to avoid industrial dislocation.

The outlook for packaging supplies, machinery and personnel is also to be covered. In addition, two technical sessions are scheduled.

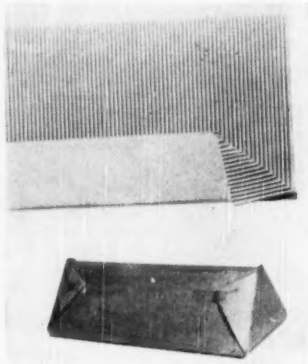
New Box Car Unloader

The S-A Box Car Unloader is a new unloading device that handles grain, dry chemicals, sand, cement and practically all bulk materials, up to 2-inch lump size, handled in box cars. A pantograph arm equipped with a scoop reaches into the car until it meets an obstruction, drops down and withdraws a load of material, discharging it to a trackside hopper. This cycle continues automatically, the single operator taking only enough time from other tasks to direct the arm to different sections of the car. A brush attachment snaps to the scoop for final clean out of the car. An unloading operation can be completed in only one half man hour.

This new unloader occupies an area of only 5'6" by 14'2" when not in use and requires only a single concrete footing for trackside mounting. Conventional rotary or tilting car dumps occupy considerably more space and require the operator's full attention at all times during the unloading cycle. Complete details on full, or semi-automatic, S-A Box Car Unloaders can be had by requesting bulletin 549 from the Stephens-Adamson Mfg. Co., Aurora, Ill.

Corrugated Board for Wrapping

Packers, hard pressed for space, time and material have a new packaging material in Shellcrease, the brand



name of Shelton Mfg. Co., Inc., 42-24 Orchard Street, Long Island City 1, N. Y., for its new corrugated board that folds in any direction with the ease of wrapping paper. Minute scoring marks in the corrugation permit folding at any point—across the corrugation or diagonally in any direction. It can be rolled against the corrugation just as easily as with the corrugation. A product wrapped in Shellcrease requires no other outside wrapping because the flat surface is high quality kraft paper. Any kind of fastening can be used such as pressure-sealing tape, twine, gummed tape, staples, stitches or steel strapping.

Film on Conveyor's Role In Materials Handling

The conveyor as basic equipment in American mass production is the subject of a new sound-strip film just completed by the Conveyor Equipment Manufacturers Association. It is of interest to industry personnel seeking means of modernizing materials handling.

The 24-minute film depicts the role mechanical handling has played in American industry.

Modern applications in more than a score of industries show how latest developments meet today's requirements.

The film, "Yours to Command," is available from R. C. Sollenberger, executive vice-president, Conveyor Equipment Manufacturers Association, 1129 Vermont Avenue, Washington 5, D. C.

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LABORATORY EQUIPMENT

Thermometer Test Set

New test set has range from —36°F to + 760°F.

Tagliabue Instruments Div. of Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J., has introduced complete sets of matched extreme precision thermometers for general laboratory temperature testing.

The unit comprises nine matched thermometers with overlapping ranges, available either in Centigrade (Celsius) or Fahrenheit scales. The instruments meet all ASTM specifications. Inclusive ranges of each set are: —36°F. to +760°F.; —38°C. to +405°C. Calibrations are in 1/10, 1/5 and ½ a degree Centigrade; 1/5, ½ and 1 degree Fahrenheit, with each thermometer accurate to within one scale division. Certificates are obtained by calibration against NBS certified thermometers.

Thermometers are made from specially selected extra-heavy glass, are 15" long and 7 to 8 mm. in diam. Expansion chambers give over-range protection. All thermometers are carefully annealed, marked with individual ice points for reference, and have integral rings at the top.

Laboratory Tongs

The user of the Niptong, manufactured by Danow Williams Co., Box 6, Clarendon Hills, Ill., need not worry about keeping tension on the tong handles. Niptong will not let go until the operator releases the spring by a slight pressure on the trigger.

• A **platinum-tipped micro-burette,** designed to deliver drops of approximately 0.01 ml., is being made by Kimble Glass, Division of Owens-Illinois Glass Co., Ohio Bldg., Toledo 1, O. The platinum-alloy delivery stem is sealed into a glass tip which can be removed for cleaning. It extends inside the glass tip for a short distance so that dirt and grease cannot clog the opening.

Two types in each of two sizes are available. One type has a standard-taper straight stopcock and funnel top, and the other a three-way interchangeable ground stopcock and plain top. The smaller size has a 5 ml. capacity and 0.01 ml. subdivisions, and the larger a 10 ml. capacity with 0.02 ml. subdivisions.

Dipper

A new rubber dipper, Stokolite L-44, in one- and two-quart sizes is now available from Stokes Molded Products, Inc., Trenton 4, N. J.

• A new **laboratory monitor** for alpha-beta-gamma detection is available from Nuclear Instrument and Chemical Corp., 229 W. Erie St., Chicago 10, Ill. This new Model 1615 "Radiation Sentinel" is a general purpose count rate instrument with wide utility. It may also be used to count activities between 100 and 50,000 counts per minute where accuracy of measurement need not be better than 3% standard error. A chart type recorder may be attached. It incorporates a permanent magnet which allows it to be mounted in any position on one side of the cabinet, and also makes possible its use on a ring stand, vacuum line, or any ferro-magnetic material.

• The new Teschner-Machlett **manometer** with Bennert scale of E. Machlett & Son, 220 E. 23rd St., New York 10, N.Y., is made entirely of metal with the exception of the glass manometer "U" tube. However, it is protected within the housing to reduce breakage to a minimum. Even if broken it is readily replaced. In addition the tube has a dust filter trap which materially reduces danger of mercury contamination. A balance type chain device, controlled by a large plastic hand wheel, permits rapid and precise scale adjustment over small as well as large distances. An "on-off" knob opens and closes a precision ground metal stopcock which is impervious to mercury vapors. A key slot on the back of the instrument permits wall mounting.

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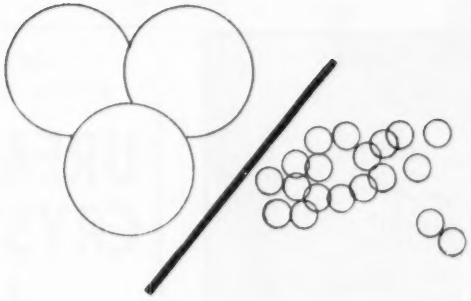

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INDUSTRY'S BOOKSHELF

Petroleum and its Products, by William J. Sweeney, Pennsylvania State College, Pennsylvania, $2.25. THE 24th annual Priestley Lectures were delivered by Dr. Sweeney with the aid of various experts from the Standard Oil group of companies. The subjects discussed include the occurrence, production, and resources of petroleum; composition and analysis of petroleum; refining of petroleum; chemical products from petroleum; utilization of petroleum products. The use of these particular volumes will probably be limited to those who are eminently familiar with the field.

The Petroleum Chemicals Industry, by Richard F. Goldstein. John Wiley & Sons, Inc., New York 16, New York; xiii + 449 pp., $8.50. PRIMARILY, this book strives to survey the fields of industrial chemistry in which petroleum is the most economical starting material. However, because of the competition that exists between petroleum-derived chemicals and those derived from vegetable materials and from coal, the author has found it necessary to delve into these fields from time to time for completion of his discussion.

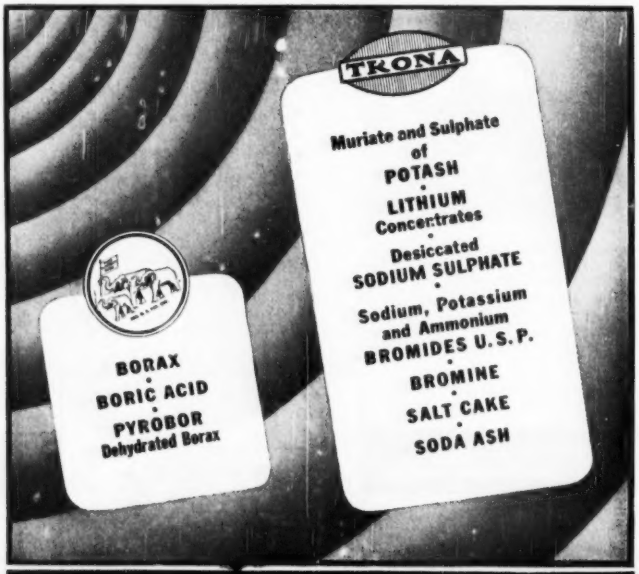
In the preface the author states that he is attempting to carry on where the two volumes on the same subject by Carleton Ellis left off in 1937. Despite the expense and labor involved, a continuation of such completely documented reference texts would be most desirable. While the author has fallen short of that high ideal, nevertheless a most excellent and comprehensive outline of the petroleum chemicals industry up to 1947 has been provided.

General Chemistry, A Systematic Approach, by H. H. Sisler, C. A. Vanderwerf, and A. W. Davidson. The Macmillan Co., New York; x + 870 pp., $5. THIS TEXT aims to live up to its title by early and continuous application of theoretical principles to the organization and discussion of descriptive matter. Since all topics cannot be treated in a book designed for a one-year general course, the authors have chosen to emphasize those particular concepts which are most valuable for the purpose of interpreting the descriptive material, such as stoichiometric principles, atomic and molecular structure, and relationships based on the periodic system.

Encyclopedia of Chemical Reactions, Volume III, edited by C. A. Jacobson. Reinhold Publishing Corp., New York; vii + 842 pp., $12. VOLUME III of this series includes the reactions of the elements cobalt, columbium, copper, didymium, dysprosium, erbium, europium, fluorine, gadolinium, gallium, germanium, gold, hafnium, holmium, hydrogen, illinium, indium, and iridium.

This is the third volume of a series intended ultimately to embrace the published reactions of the active chemical elements and their simpler compounds.

Physical Chemistry of Hydrocarbons, (Volume I), edited by Adalbert Farkas. Academic Press, Inc., New York; x + 453 pp., $8.50. SEVERAL AUTHORS contribute to this volume, which summarizes the physico-chemical basis of the new techniques and methods recently adopted by the hydrocarbons in-



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dustry, and helps the research worker in exploiting these procedures more extensively and more intensively. Although these data have been published before in dispersed fashion, this book brings all of this information together. It has been written primarily for the chemist, engineer, or physicist engaged in the various fields concerned with hydrocarbons.

Boron Trifluoride and its Derivatives, by H. S. Booth and D. R. Martin. John Wiley & Sons, Inc., New York; ix + 315 pp., $5.

RESEARCH ON applications of boron trifluoride and its complexes has resulted in a rapid expansion of knowledge in the field, and the development of many applications. This book presents information to facilitate investigations made with boron trifluoride. The material has particular value for research chemists in the petroleum industry, the plastics and polymer industry, for organic chemists interested in condensation and polymerization reactions, and for chemists in the electroplating, steel, and ceramics industries.

OPD Record of Prices (1950) on Chemicals and Related Materials, Vol. I., Oil Paint and Drug Reporter, New York; 172 pp., $5.

THIS FIRST volume of what is to be a continuing program of presenting yearly reviews of prices appearing in the *Oil, Paint and Drug Reporter* contains the whole annual review sections of the paper for January 30, 1950; for January 30, 1949; and for February 16, 1948; together with a price review from *OPD* for February 10, 1941. The next volume will add the 1951 review section and drop the 1948 one, and so on for succeeding years, to provide a comparative record of prices for chemicals and related materials for market researchers and others interested in such information.

Introduction to the Transfer of Heat and Mass, by E. R. G. Eckert. McGraw-Hill Book Co., New York, New York; xiii + 284 pp., $4.00.

THE CLOSE relationship between the transfer of heat and mass is detailed in this text, written at the graduate level. It is a translation and adaptation of the author's original German text, and will be of special interest to both mechanical and engineering students.

The evaporation and condensation of water vapor are the basis for the treatment of heat transfer and the mass transfer.

The conception of the boundary layer as the location where most of the conductive heat transfer occurs is stressed. The von Karman mo-

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PARADENE #1, 2, 3, 33, 34 and 35	Melting point from 20° to 130° C. Readily soluble in petroleum and coal-tar (aromatic) solvents.	Used in manufacture of adhesives, concrete curing compounds, electrical insulation, floor tile, linoleum, paints and varnishes, pipe coatings, textile coatings and in compounding of natural and synthetic rubber.
465 RESIN	Melting point—105° to 120° C. Soluble in aromatic solvents and partially in petroleum solvents.	Used in the manufacture of adhesives, box toes, ethyl cellulose lacquers, impregnations, linoleum, floor tile, sealing compounds, varnishes and in the compounding of natural and synthetic rubber.
NUBA #1, 2, 3X	Melting point from 80° to 135° C. Soluble in aromatic solvents. They are cohesive and have high molten viscosity.	Used in the manufacture of adhesives, binders, box toes, briquettes, composition insulating blocks; filling, stiffening, molding and thermal insulating compounds; leather dressings, steep-roof coatings and for compounding natural and synthetic rubber.

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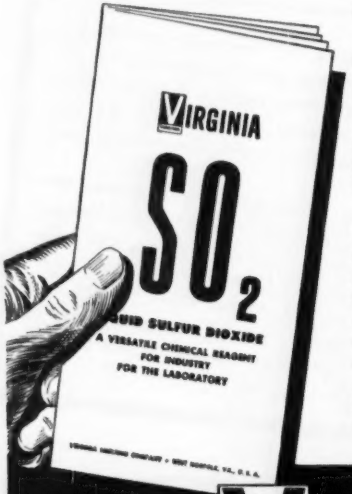

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mentum equation and analogous equation for heat and mass flow are used to solve many heat-transfer problems mathematically. New topics discussed include regenerative heat exchangers, heat transfer at high velocities and studies with the Zehnder-Mach interferometer.

Industrial Instrumentation, by Donald P. Eckman. John Wiley & Sons, Inc., New York 16, New York; vi + 396 pp., $5.00.

AN INTRODUCTION to the science of measurement is provided by this book. New methods and techniques have made this art a science with its own physical foundation and extended it far beyond the elementary concepts of temperature and pressure determination.

The purpose of this book is to review the principles of the methods of measurements employed in industrial processing and manufacturing. Primary emphasis is on method rather than mechanisms. However, attention is paid to the pertinent practical details. The undergraduate in engineering is the target for this book. Problems are provided at the end of each chapter.

Other Publications

FILTER FACTS is a new house organ published by T. Shriver & Co., Inc., 872 Hamilton St., Harrison, N. J., in interest of better processing.

FBI REGISTER OF BRITISH MANUFACTURERS. Twenty-Second Edition, 1949-50. Published for The Federation of British Industries by Kelly's Directories Ltd. and Iliffe & Sons Ltd., Dorset House, Stamford St., London S.E.1., 42/, post free. Containing 807 pages, it lists nearly 6,000 firms and their products.

PAINTS is the title of a compilation of selected government research reports issued by The British Ministry of Supply. It contains eight reports on various topics in the field. His Majesty's Stationery Office, York House Kingsway, London, W.C.2, 5/.

A CONCISE PHARMACOLOGY AND THERAPEUTICS represents an attempt to present concisely, but in sufficient detail, the pharmacology of the more important drugs used in the British Commonwealth and the United States. Leonard Hill Limited, 17 Stratford Place, London, W.1., 21/.

ANNUAL REPORTS OF THE SOCIETY OF CHEMICAL INDUSTRY ON THE PROGRESS OF APPLIED CHEMISTRY, Volume 33, 1948, is available from the Society at 9-10 Savile Row, London, W.1. The price is $5.03 to non-members, $3 to members.

DIRECTORY OF BIOLOGICAL LABORATORIES, Fourth Edition, lists laboratories of the United States concerned with biological, bacteriological of biochemical investigations. Personnel are included as is a list of sources of supply for equipment and materials. 140 pp., $3, Burns Compiling & Research Organization, 200 Railway Exchange Bldg., Chicago 4, Ill.

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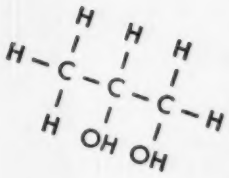

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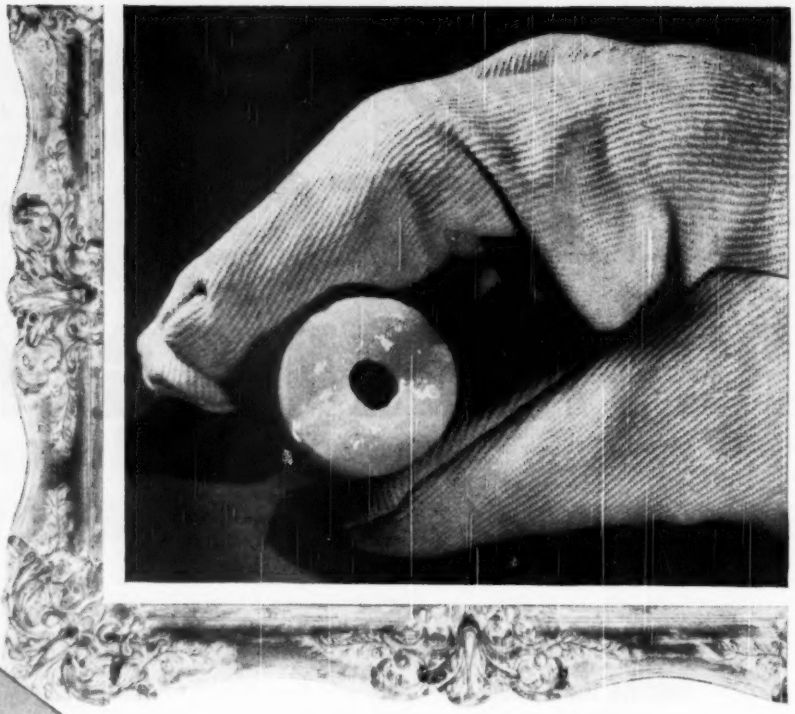

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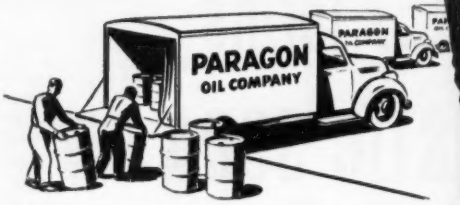

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NEWS OF THE MONTH

New Construction

• **The "distinct possibility"** that Du Pont's announcement that it would require 400 million lbs. of corn cobs (about 40 million lbs. of furfural) for its new adiponitrile plant (**CI Newsletter, April 1950**) is now an actuality. The Quaker Oats Co. is starting immediate construction of a furfural plant at Omaha, Neb. Process steam and power will be supplied on contract by Omaha Public Power District. The new plant should be completed and in production by the end of 1951.

• **Commercial production** of a new line of synthetic organic plasticizers is now under way at the recently completed plant of Pittsburgh Coke & Chemical Co., at Neville Island, Pa. Several phthalate and phosphate type plasticizers, a number of esters of adipic and sebacic acid, and various specialties are being made.

• **More TEL** should be available by the end of 1951 when Ethyl Corp. expects new manufacturing plants for antiknock compounds to be completed. Construction is starting immediately near Houston, Tex. All principal intermediates will be manufactured on the site—engineering plans call for units to make tetraethyl lead, sodium and chlorine, sodium-lead alloy, and ethyl chloride. Other units include lead recovery furnaces; laboratories; storage tanks for TEL, ethyl chloride, chlorine, and ethylene dibromide; a blender; and trackage for a fleet of tank cars.

Ethyl is also now installing additional facilities to increase capacity at its Baton Rouge plant, and these will be in operation by the end of the year.

• **A newly formed company**—The Industrial Fermentation Co.—plans to build a $5 million industrial alcohol plant with grain as the raw material at a Southwest Kansas site. Daily production of 18,000 gallons from 6,000 bushels of wheat is anticipated.

The Securities Exchange Commission has authorized the company, composed of farmers and business men from the area, to issue $127,000 worth of stock and the company anticipates issuing $3 million worth eventually upon clearance with the SEC. Stock will be traded for grain.

• **Two latex production plants** have been completed by The Dow Chemical Co. These include a new plant at Freeport, Tex., and the rebuilt plant at Midland, both of which are now in production. The latter, damaged by fire five months ago, has been completely rebuilt and enlarged. The new plants provide Dow with double the latex capacity it had before the fire.

Don C. Oskin (left), made director of district sales, Westvaco Chemical Division, Food Machinery and Chemical Corp., and George J. King, appointed director of sales of the Industrial Chemicals Department, Atlas Powder Co. Mr. Oskin has been in charge of the Phosphate Sales Division of his company; Mr. King has been branch manager at Atlas' New York office.

• **Another solvent extraction plant** for processing soybean will replace an expeller plant at Painesville, Ohio. A. E. Staley Manufacturing Co. will start construction on the new unit, to replace an expeller unit that has operated at the site since 1939, in January or February, with completion scheduled for the fall of 1951. Daily capacity will be 10,000 bushels. This will be the third extraction plant of the solvent extraction type built by Staley at Painesville, the first having been built in 1949 and the second being currently completed. When the latter is complete the company will have the greatest solvent extraction processing capacity of any single plant in the nation at this location.

• **The first styrene plastic plant** west of the Mississippi was recently dedicated at Long Beach, Calif. This is Monsanto Chemical Co.'s new unit to supply West Coast manufacturers.

• **Construction is under way** on Stauffer Chemical Co.'s new research laboratory at Dobbs Ferry, N. Y. A one-story structure, it is being built by the H. K. Ferguson Co. It will have the research staff of Stauffer's Eastern Division now scattered in several locations in and around New York City. Stauffer's Chauncey Plant located nearby will furnish facilities for pilot plant testing of products and processes developed at the new laboratory.

Stauffer has also enlarged its research laboratory at Richmond, Calif., by the addition of a wing. This is part of the company's program to expand research facilities throughout the country.

• **More Teflon** will be available as The DuPont Co. has just completed a new unit at Parkersburg, W. Va., plant for this tetrafluoroethylene resin material. Capacity is several times that of DuPont's Arlington, N. J., plant where manufacture in relatively small quantities was started in 1943. For the next few months only granular Teflon will be produced, but further expansion is under way for the manufacture of the new Teflon suspensoid, a suspension of minute particles of the plastic in a liquid.

• **Contracts have been let** by Foster D. Snell, Inc. for the first unit of its laboratories in Bainbridge, N. Y. The present structure is a single wing which can be made into four wings with extensions. This first unit will be occupied by Snell's Supplee division conducting vitamin work and supplying animals to other laboratories. This project does not envisage any change at present in Snell's New York City activities.

• **An expansion** that will increase capacity of its sorbitol units by nearly 50% has been undertaken by Atlas Powder Co. at Atlas Point, Wilmington, Del. New production will start about October 1 of this year.

• **The Bureau of Mines** gas-synthesis demonstration plant at Louisiana, Mo., an 80- to 100-barrel-a-day unit that will convert coal to oil by a modified Fischer-Tropsch process, is nearing completion since the contract for major construction has been completed. Koppers Co., Inc., Pittsburgh, held this $5 million design and construction contract. Much additional work remains to be done before that plant begins integrated operations early next year.

• **National Carbon Division** of Union Carbide and Carbon Corp. is considering a $5 million expansion of its electrode plant at Columbia, Tenn. This expansion of its graphite electrode production awaits formal approval of arrangement with TVA for power.

• **A new power station** employing pressurized furnaces on the boilers has been put into operation at Midland, Mich., by The Dow Chemical Co. Housed in the main 35,000 sq. ft. building are one turbine, two boilers and their auxiliaries. The

water conditioning plant for feedwater makeup is the largest demineralization plant in the world. The furnaces used on the boilers are the second and third pressurized units ever placed in operation anywhere, and none of the steam from the turbine is condensed but is extracted for process use. Boiler efficiency at all loads from the plant is recorded at an unusually high 90 plus per cent.

• **A $150,000 expansion program** at its Portland, Ore., plant is being completed by the Pennsylvania Salt Manufacturing Co. Facilities for additional DDT and chlorate production are being finished as well as certain additions to caustic soda and chlorine capacity.

• **Electrolytic chromium** will be produced in a new plant to be constructed at Sault Ste. Marie, Mich., by the Electro Metallurgical Division, Union Carbide and Carbon Corp. Based on an entirely new process, many important steps for which were developed by the Bureau of Mines, the new plant is expected to be in operation by the spring of 1951.

• **A two-story laboratory** has been completed by A. Gross & Co., at its main plant in Newark, N. J. The first floor will be devoted primarily to production control; the second, to research.

• **A seventh complete reduction line** to be installed at the Kaiser Aluminum & Chemical Corp.'s Mead plant at Spokane, Wash., by next March, will increase aluminum pig capacity there 40 million lbs. a year. This, with added and improved facilities at Kaiser's Spokane and Tacoma plants, will raise the company's aluminum pig capacity to 340 million lbs.—a 30 per cent gain over its original rated capacity.

Washington

• **The Government** has ordered reopening of the 75,000-ton-a-year copolymer plant at Los Angeles, operated by Goodyear Synthetic Rubber Corp. and the 30,000-ton copolymer plant at Louisville, Ky., operated by National Synthetic Rubber Corp., wholly-owned subsidiary of Minnesota Mining & Manufacturing Co. It has also ordered reopened the following standby butadiene facilities: 15,000-tons-a-year Baton Rouge, La., plant operated by Esso Standard Oil Co.; 25,000-ton Torrance, Calif., operated by Shell Chemical Corp.; and the 18,000-ton El Segundo, Calif., butane plant, operated by Standard Oil of California. These actions mean that the Government's synthetic rubber program will be operated at a 675,000-long-ton-a-year rate after the first of the year.

George V. Taylor (left), promoted to position of director of sales development for Spencer Chemical Co., and Irvin H. Jones, named international development manager for Koppers Co., Inc. Mr. Taylor has been director of market research for Spencer since 1947; Mr. Jones has been manager of the patent section of Koppers' research department.

Ownership Changes

• **The Government has leased** the San Jacinto Ammonia Works near Houston, Tex., to the R. F. Mueller Co., Baltimore. It will be operated under the name San Jacinto Chemical Corp. It has an anhydrous ammonia capacity of 70 tons per day.

• **Stockholders of Atlas Powder Co.** and Darco Corp. have approved the

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merger of the Darco Corp. with and into Atlas Powder Co.

• **Reichhold Chemicals, Inc.** has purchased a plant in Argo, Ill., which will be renovated, enlarged and equipped for large-scale production of synthetic resins. Reichhold estimates that within a year the output at Argo will represent about $5 million in sales to the company.

General Topics

• **The Agricultural and Mechanical College of Texas,** College Station, Tex., will offer its Fifth Symposium on "Instrumentation for the Process Industries," October 11-13, 1950. It will be conducted as a seminar with lectures and discussions on the subject of automatic control.

• **The American Society for Testing Materials** will form a new technical Committee on Sampling and Analysis of Atmospheric Pollution. Dr. Louis C. McCabe, chief of Air and Stream Pollution, U. S. Bureau of Mines, has accepted temporary chairmanship of the new committee.

• **The 2nd Plant Maintenance Show and Conference** will be held at the Auditorium in Cleveland, Ohio, January 15-18, 1950.

• **Chemical companies** report the following sales and earnings on past operations:

Company	Sales for Six Months Ending June 1950	Sales for Six Months Ending June 1949	Net Income for Six Months Ending June 1950	Net Income for Six Months Ending June 1949
American Potash & Chem. Corp.	$ 7,536,736	$ 6,605,138	$ 1,035,907	$ 797,732
Atlas Powder Co.	18,350,043	.....	1,151,572	.....
Celanese Corp. of America	105,612,621	73,774,597	21,441,284	6,174,659
Commercial Solvents Corp.	.....	.....	1,376,011	1,563,757
Dewey and Almy Chemical Co.	9,003,491	7,446,076	679,770	174,753
The Dow Chemical Co.*	220,830,183*	200,370,952*	33,813,105*	25,260,473*
E. I. du Pont de Nemours & Co.	580,888,994	498,337,831	91,125,675	61,545,985
Freeport Sulphur Co.	.....	.....	3,165,661	2,607,130
Hercules Powder Co.	71,056,149	60,406,197	.....	.....
Industrial Rayon Corp.	.....	.....	6,819,854	.....
Minnesota Mining & Mfg. Co.	65,577,460	54,552,850	9,682,389	6,330,227
Pennsylvania Salt Mfg. Co.	19,432,106	16,051,743	2,065,544	1,304,570
Sterling Drug, Inc.	68,195,281	67,306,362	7,829,004	7,259,322
Texas Gulf Sulphur Co., Inc.**	17,656,016**	.....	7,413,373**	.....
Union Carbide and Carbon Corp.	330,840,573	288,748,244	60,805,199	42,126,139

* For the fiscal year ended May 31, 1950.
** For the three months ended June 30, 1950.

Foreign Developments

• **Oakland Metal Company Ltd.** has established a chemical export sales department at 94 New Bond Street, London W. 1 for complete service to overseas customers.

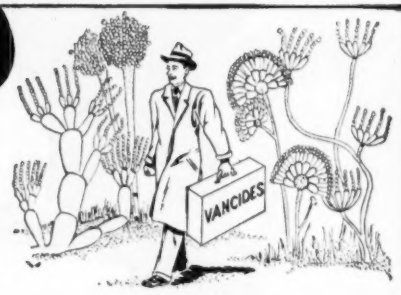
• **A $600,000 alcohol plant,** with a rated production of 7200 gals. per day of absolute ethyl alcohol, has just been completed in Ciudad Trojillo, Dominican Republic. It will use about 6.5 million gals. of local blackstrap molasses per year. The plant has been designed to withstand earthquakes and wind with a velocity of 180 miles per hour that may be expected in the area. Engineering was done by Kohn & Pechenick, Brooklyn, N. Y., with R. S. Aries & Associates as consultants. It was a turn-key job.

• **Monsanto Chemicals** will produce polystyrene at Newport, Monmouthshire, Britain. Initially, British production will be based on imported styrene, but ultimately the raw material will be produced at a new plant to be erected at Grangemouth.

Company Notes

• **To have the company represented** at higher levels of the Federal Government in Washington, Monsanto Chemical Co. has appointed its vice-president, Francis J. Curtis, director of industrial preparedness for the

WANTED
NEW WORLDS TO CONQUER



The new series of Vancides are looking for trouble . . . trouble with mold, decay, and spoiling.

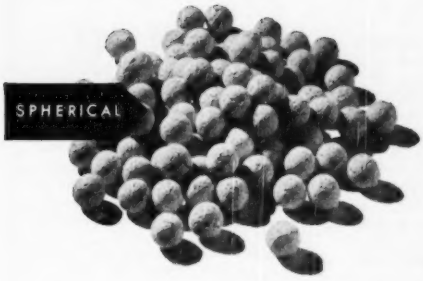
Have you a preservation problem?

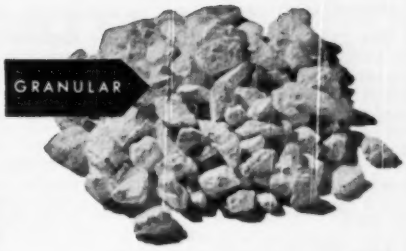
These non-volatile derivatives of mercaptobenzothiazole have already proved their worth as fungicides, bactericides, and algicides in some difficult preservation problems. Vancides are appreciably LESS TOXIC ORALLY than quaternary ammonium compounds. On skin, Vancides are NOT PRIMARY IRRITANTS. Characteristics of non-volatility insure effective, constant concentrations.

Won't you describe your problem and request a sample of one of the applicable Vancides?

Better yet, take advantage of our research laboratory facilities and let us help you solve your preservation problems with one of the new Vancides.

R. T. VANDERBILT COMPANY
SPECIALTIES DEPARTMENT
230 PARK AVE. NEW YORK 17, N. Y.





HARSHAW

you specify the catalyst

HARSHAW can make it!

• Harshaw has a large production capacity for preformed catalysts. In many cases economies can be realized by having Harshaw manufacture catalysts to specification for Hydroforming . . . Cyclization . . . Oxidation . . . Dehydrogenation . . . Hydrogenation . . . Dehydration . . . Desulphurization . . . Alkylation . . . Isomerization. Typical catalysts and catalytic chemicals are . . . Aluminum Chloride Anhydrous . . . Boron Fluoride Addition Compounds . . . Boron Trifluoride . . . Hydrofluoric Acid Anhydrous . . . Activated Alumina . . . Chrome Alumina . . . Molybdena Alumina . . . Tungsten Alumina . . . Cobalt . . . Copper . . . Copper Chromite . . . Magnesia . . . Nickel . . . Vanadium.

Our experienced technical staff will assist you in developing the best and most economical catalyst. If you have a catalytic process in the development or production stage, a discussion with us may prove beneficial.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

company, with headquarters in the capitol. Philip R. Tarr, European technical representative, has been appointed assistant director.

• **The Columbia Chemical Division** of Pittsburgh Plate Glass Co. has signed a three-year contract with Allied Chemical Workers, independent, at the firm's large Barberton, Ohio, plant. Union employees were granted a five cents an hour general wage increase immediately, five cents more on June 28, 1951, and a third wage increase on June 28, 1952.

• **Lion Oil Co.** attributes a 52 per cent increase in dividend payments per share during the first six months of 1950 to increased earnings due both to substantially increased production of crude oil and to sustained high volume of chemical operation.

• **Carter Products Corp.,** Cleveland, has changed its name to Carlon Products Corp. to consolidate its products and facilities under the trade name Carlon.

• **Infilco Inc.** is locating its research, development and engineering divisions as well as general offices in Tucson, Arizona. Temporary quarters will be occupied while a new building for its expanding operations is built. Manufacturing, chemical laboratories, and certain other activities will continue in its present Chicago plant.

• **Four new automatic pumping stations,** operated by remote control from its New York City office has been installed on the Shell Oil Co.'s 8-inch petroleum products pipeline. Installed between the Wood River, Ill., refinery and Columbus, Ohio, they are operated by a "telephone" dial by which a dispatcher in New York can start or stop each station and take instrument readings. The system, using General Electric Co. equipment, was devised by GE and Shell engineers in collaboration with American Telephone and Telegraph Co.

• **Hooker Electrochemical Co.** has signed a five-year contract with its employees union for the company's Niagara Falls plant. Included are a general pay increase of 6 cents an hour and other benefits.

• **Magnus, Mabee & Reynolds, Inc.** has been appointed New York area distributor of The Dow Chemical Co.'s propylene glycol.

• **Atomic Instrument Co.** has moved to new and larger quarters at 84 Massachusetts Ave., Cambridge 39, Mass. This puts the company in the midst of the Cambridge research area.

CALENDAR *of* EVENTS

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS, The Wentworth, Portsmouth, N. H., Sept. 28-30.

AMERICAN COKE AND CHEMICALS INSTITUTE, Skytop Lodge, Skytop, Pa., Sept. 27-29.

AMERICAN GAS ASSOCIATION, annual convention, Atlantic City, N. J., Oct.- 2-6.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, annual meeting, Columbus, O., Dec. 3-6.

AMERICAN OIL CHEMISTS SOCIETY, fall meeting, Sir Francis Drake Hotel, San Francisco, Sept. 26-28.

AMERICAN PETROLEUM INSTITUTE, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, Cal., Nov. 13-16.

AMERICAN PHARMACEUTICAL MANUFACTURERS ASSOCIATION, mid-year meeting, Waldorf-Astoria, New York City, Nov. 27-29.

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS INC., annual meeting, Sherburne Hotel, New York City, Oct. 24.

CHEMICAL SPECIALTIES MANUFACTURING ASSOCIATION, annual meeting, Hotel New Yorker, New York City, Dec. 4-5.

DRUG, CHEMICAL AND ALLIED TRADES SECTION, New York Board of Trade, annual meetig, Shawnee Inn, Shawnee-on-Delaware, Pa., Sept 21-23.

ELECTROCHEMICAL SOCIETY, INC., Hotel Statler, Buffalo, N. Y., Oct. 11-14.

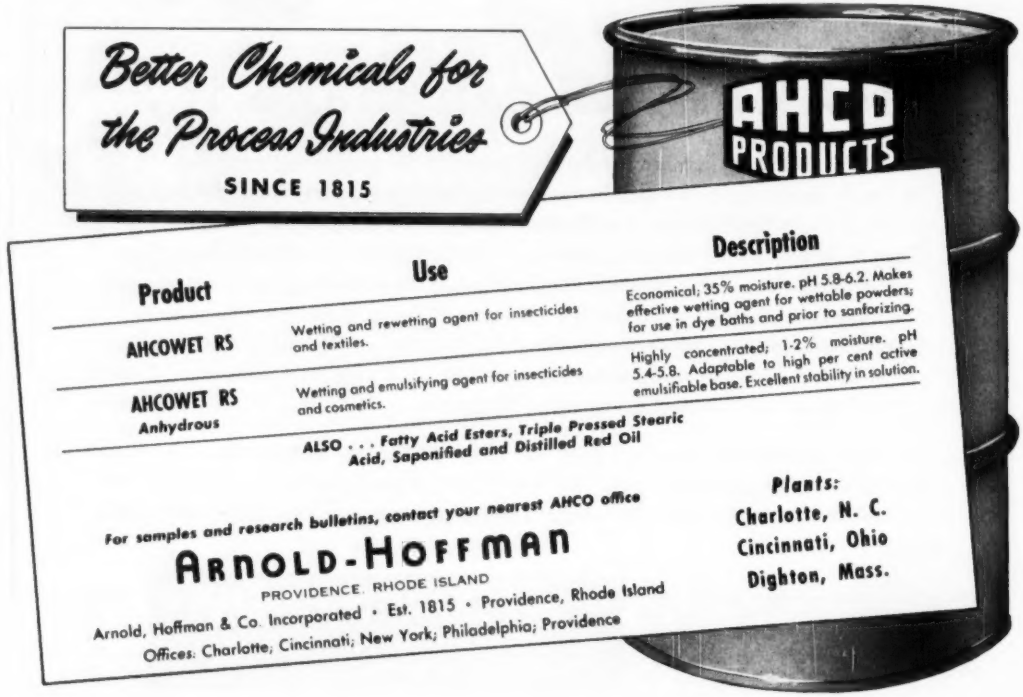
INDUSTRIAL PACKAGING AND MATERIALS HANDLING EXPOSITION, Philadelphia, Pa., Sept. 26-29.

INSTRUMENT SOCIETY OF AMERICA, instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y., Sept 18-22.

SOCIETY OF THE PLASTICS INDUSTRY, annual national conference, New Ocean House, Swampscott, Mass., Oct. 18-20.

TANNERS COUNCIL OF AMERICA, INC., annual meeting, Edgewater Beach Hotel, Chicago, Oct. 26-27.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, paper-plastics conference, Marshall Hall, New York State College of Forestry, Syracuse, N. Y., Oct 19-20.


Better Chemicals for the Process Industries
SINCE 1815
AHCO PRODUCTS
Product
Use
Description
AHCOWET RS
Wetting and rewetting agent for insecticides and textiles.
Economical; 35% moisture. pH 5.8-6.2. Makes effective wetting agent for wettable powders; for use in dye baths and prior to sanforizing.
AHCOWET RS Anhydrous
Wetting and emulsifying agent for insecticides and cosmetics.
Highly concentrated; 1-2% moisture. pH 5.4-5.8. Adaptable to high per cent active emulsifiable base. Excellent stability in solution.
ALSO . . . Fatty Acid Esters, Triple Pressed Stearic Acid, Saponified and Distilled Red Oil
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Arnold, Hoffman & Co. Incorporated • Est. 1815 • Providence, Rhode Island
Offices: Charlotte, Cincinnati, New York; Philadelphia; Providence
Plants:
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Cincinnati, Ohio
Dighton, Mass.

DRYMET*

THE ECONOMICAL DETERGENT SILICATE

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both Na_2O (alkalinity) and SiO_2 (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

DRYSEQ*

THE ALL-PURPOSE DETERGENT SILICATE

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% Na_2O—making it an economical base material for compounding.

DRYORTH*

THE HEAVY-DUTY DETERGENT SILICATE

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% Na_2O, which may also be used as an economical constituent of high pH cleaning compounds.

CRYSTAMET*

THE MEDIUM pH DETERGENT SILICATE

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble—chemically stable—easy to handle. Can be used on medium pH jobs.

Cowles Chemicals

We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.

PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS

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COWLES CHEMICAL COMPANY

HEAVY CHEMICAL DEPARTMENT • CLEVELAND 3, OHIO

321 STAINLESS

An Assured Supply Lower Cost Technical DATA*

*The assurance of a continuous supply of Titanium to make stabilized austenitic chromium nickel steel...plus the economic advantage of the lower price of type 321 has focused increasing attention on its other outstanding features. Among these are excellent high temperature properties, thermal shock resistance and ease of drawing and forming.

In the "as-welded" state, as normally used, 321 shows a high order of corrosion resistance in a variety of corrosive media. It is being used effectively in many installations with type 347 weld rods used in welding.

* In developing the Low Carbon Ferro Titanium alloys used in making 321 stainless, TAM has acquired much worthwhile technical data. Therefore, although we do not supply steel, we can supply you with information of value. Write our New York City Office.

TAM PRODUCTS
Registered U. S. Pat. Off.

*TAM is a registered trademark.

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY
Executive and Sales Office: 111 BROADWAY, NEW YORK CITY • General Offices, Works, and Research Laboratories: NIAGARA FALLS, N. Y.

PERSONNEL

Arnold Belchetz (left), who has begun practice as a consultant to the petroleum and chemical industries at Larchmont, N. Y., and W. H. Winans, elected vice-president—industrial relations, for Union Carbide and Carbon Corp. Dr. Belchetz, at one time director of research and development for Stauffer Chemical Co., was chief technologist for Shell Petroleum Corp. and later head of the new processes department of M. W. Kellogg Co. Mr. Winans has been in industrial relations work since he joined his corporation in 1916.

Company Officers

• **Evans Chemetics, Inc.,** has elected R. A. Kramer vice president in charge of sales. For the past nine years he has been sales manager of the corporation.

• **Mallinckrodt Chemical Works** has elected August H. Homeyer a Director, and made the following appointments: Vice presidents, John R. Ruhoff, Norman P. Knowlton, and Harold E. Thayer; secretary, John E. Gaston; assistant treasurer, John G. Moore; assistant secretaries, Russell F. Ritschy and John G. Moore.

• R. W. Thomas, manager of the research and development department, **Phillips Petroleum Co.,** has been elected vice president of research and development and will supervise research and patent activities, as well as chemical manufacturing, development, and sales. He started in the engineering department in 1926.

Sales

• Willard R. Barrett, formerly vice president and general manager of the Hoosier Cardinal Corp., has been named sales manager for the Plastics Division of the **General Electric Co.**

• **Baker Castor Oil Co.** has appointed Robert Vignolo Pacific Coast sales manager. He will be responsible for the sale of all Baker products on the West Coast. His offices will be located at Baker's Los Angeles plant.

• Barclay E. Mackinnon has been named general sales manager of **The New York Quinine & Chemical**

Quality
FINE CHEMICALS
for Diazotype Reproduction

Purified chemicals of dependable uniform high quality for coating diazotype papers.

SENSITIZERS:
(Stabilized diazo salts)

Compound 1
(p-diazo diphenylamine sulfate) Ammonia blue line and semiwet black line papers.

Compound 8
(p-diazo dimethyl aniline zinc chloride) Ammonia brown line intermediate papers.

Compound 9
(p-diazo diethyl aniline zinc chloride) Ammonia blue line fast papers.

Compound 10
(p-diazo ethyl hydroxyethyl aniline zinc chloride) Ammonia black line medium speed papers.

DEVELOPERS:

Phloroglucinol (sym. trihydroxy benzene) Semiwet black line papers.

R-salt (2-naphthol-3, 6-disulfonic acid sodium) Ammonia blue line papers.

Coupler III (2, 3-dihydroxy naphthalene-6-sulfonic acid sodium) Ammonia blue and black line waterfast papers.

OTHER COATING CHEMICALS:

Prussaid
Citric Acid
Thiourea
Zinc Chloride
Ferrous Oxalate
1, 3, 6-Naphthalene Trisulfonic Acid Sodium Salt
Resorcinol
Diethylene glycol
Glycerine

Photographic developers, fixers and specialties also available in bulk.

E D W A L

EDWAL
LABORATORIES, INC.

Write for working samples and price quotations.

Plant and Office
RINGWOOD, ILLINOIS

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Quality
FINE CHEMICALS
for Diazotype Reproduction

Purified chemicals of dependable uniform high quality for coating diazotype papers.

SENSITIZERS:
(Stabilized diazo salts)

Compound 1
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Thiourea
Zinc Chloride
Ferrous Oxalate
1, 3, 6-Naphthalene Trisulfonic Acid Sodium Salt
Resorcinol
Diethylene glycol
Glycerine

Photographic developers, fixers and specialties also available in bulk.

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SODIUM NITRITE
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CABLE ADDRESS "CONRAYPRO"

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PHOSPHORUS TRICHLORIDE	SODIUM CHLORATE
PHOSPHORUS PENTACHLORIDE	POTASSIUM CHLORATE
PHOSPHORUS PENTASULFIDE	POTASSIUM PERCHLORATE
PHOSPHORUS SESQUISULPHIDE	HYPOPHOSPHITES
AMORPHOUS PHOSPHORUS	OXALIC ACID (Powdered or Crystal)

ZINC PHOSPHIDE

Plant and Main Office:
NIAGARA FALLS, NEW YORK

New York Office:
19 RECTOR ST., NEW YORK 6, N.Y.

Works, Inc. He joined N.Y.Q. in 1933 and has been associated with the company in various capacities ever since. He was elected a vice president in 1949.

John C. Robinson (left), named vice-president in charge of production at the Mamaroneck plant of Robinson, Wagner Co., and Forest B. Evans, named assistant to the general manager of the Virginia Cellulose Department of Hercules Powder Co. Mr. Robinson has been engaged in research and development work for his company; Mr. Evans has been plant manager of the Virginia Cellulose plant at Hopewell, Va.

Production

• James C. Rankin has been named manager of the four **Glidden Co.** operating units in Indianapolis. Manager of the Glidden Feed Mill Division in Indianapolis since May, 1949, Mr. Rankin now has been made responsible for operation of the new $3,000,000 soya extraction plant, the one and one-half million bushel grain elevator, and the Paint and Varnish Division warehouse.

Research

• The **Hooker Electrochemical Co.**, Niagara Falls, N. Y., has appointed Joy E. Beanblossom manager of development; James S. Sconce, manager of research, and Bruno H. Wojcik assistant to the technical superintendent.

• John B. Taylor, Jr., has been appointed assistant director of research at the **Ethyl Corp.** laboratories in Detroit, Michigan.

• W. L. Nelson has been named technical service and development manager for **The Dow Chemical Co.**'s Great Western Division.

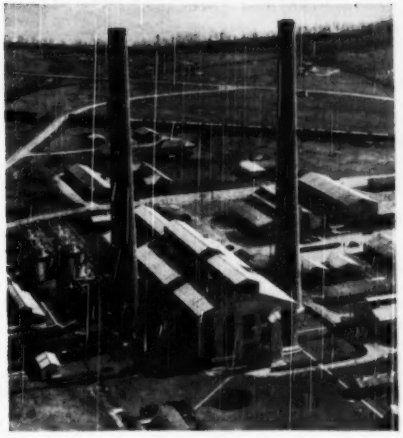
Died

• John L. Smith, chairman of the board of **Chas. Pfizer & Co., Inc.**, died July 10, after an illness of several months. In 1906 he joined Pfizer. He was made a member of the board of directors in 1920 and progressed through various official positions until elected president of the company in 1945. In 1949, Mr. Smith was made chairman of the board, the position he held until his death.

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*MINING



The process of mining sulphur, as developed by Herman Frasch, takes advantage of the fairly low melting point of sulphur (about 240° Fahrenheit). The process resolves itself into three parts: one, operating a power plant that heats and pumps to the field large quantities of water; two, distributing the hot water through wells to melt the underground sulphur, and raising the melted sulphur to the surface; three, cooling and solidifying the sulphur in large vats from which it is broken and loaded into cars for shipment.

The power plant and water reservoir, as well as the vats and permanent structures, are placed at some distance from the sulphur deposit to avoid possibility of damage from surface subsidence, resulting from extraction of the underground sulphur.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.

TEXAS GULF SULPHUR CO.
INC.
75 East 45th St. New York 17, N. Y.
Mines: Newgulf and Moss Bluff, Texas

JAPAN WAX
CARNAUBA
and substitute waxes

CANDELILLA
PRIME, CRUDE,
and REFINED FLAKED

ORANGE - BUTTON - BLEACHED
DEWAXED
SHELLAC
Direct Importers
from our own sources

BEESWAX
AFRICAN CRUDE
South American
Bleachable

WM.
DIEHL
& COMPANY
334 W. 42nd Street
New York, N. Y.
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Cable Address: DIEHLWILL

CHEMICAL MARKETS

Synthetic Detergents Gain As Soap Sales Decline

Soap sales for the six months of 1950 were 11% below last year. The decrease was more than made up by increased sales of synthetic detergents, with the combined total of both up nearly 4%, according to the Association of American Soap & Glycerine Producers, Inc.

Sales census reports to the Association from 83 manufacturers, representing a very substantial portion of the industry's volume, show non-liquid soap sales amounting to 1, 117,310,000 pounds, through June 30,1950. In 1949 the total reported was 1,253,722,000 pounds,

Sales of synthetic detergents were reported by 34 companies for the six months at 521,903,000 pounds compared to sales in 1949 reported by 33 companies at 325,376,000 pounds.

Liquid soap sold during the first half was reported by 52 companies at 2,220,000 gallons compared to sales of 2,870,000 gallons reported by 57 companies in 1949.

Lower Copra Exports

Exports in 1950 of copra and coconut oil, in terms of copra, from the major producing areas of the world —the Philippines, Indonesia, Ceylon, and Malaya — are expected to be somewhat smaller than in 1949, according to information available to the Office of Foreign Agricultural Relations. The anticipated increase in Philippine exports is expected to be offset by a comparable decrease in Indonesian shipments. Likewise, any increase in Mayala may be counteracted by a decline in Ceylon.

Exports from these four areas during the first quarter of this year totaled 215,660 long tons, copra basis, representing a decrease of 18 percent from the comparable period of 1949, with the Philippines and Mayala showing increases of 7 and 50 percent, respectively, and Indonesia and Ceylon decreases of 36 and 69 percent, respectively.

Inorganics Dip in June

U. S. production levels of industrially important inorganic chemicals were generally lower in June than those reported for May 1950, according to the Bureau of Census. They were, however, higher than for June 1949. Of the 37 chemicals included in this survey, only 6 were produced in larger volume during June than during May, while 30 were produced in larger volume, and three in smaller volume than during June 1949.

Quantities produced in June 1950 exceeded the amounts for the corresponding period of last year for all the "heavy volume" chemicals in this survey except for soda ash. The effect of the strike in the alkali industry was shown by a dip in production of wet and dry ammonia soda process soda ash from 388,169 short tons in May to 291,681 short tons in June, compared with 309,379 short tons produced in June 1949. Gains over the last month's production figures were reported for calcium arsenate, carbon dioxide, sodium metaphosphate, sodium tetraphosphate, sodium bichromate and chromate and zinc yellow.

Phthalic Leading Import Among Intermediates

The most important intermediate in terms of quantity, among coal-tar products imported by the United States in 1949 was phthalic anhydride, imports of which amounted to 2.3 million pounds and came largely from Belgium. Among finished coal-tar products imported, dyes continued to be the most important group and accounted for almost 80% of the total value of imports in this class. These facts were revealed in the U. S. Tariff Commission report on imports of coal-tar products entering in 1949, which previously was issued as soon after the calendar year end as possible, but which is now issued not less than six months after the end of the period. This new policy is designed to protect importers from too early disclosure to the trade of imports of new items.

In 1949, imports entering under paragraph 27 of the Tariff Act of 1930 (chiefly coal-tar intermediates) totaled 3.7 million pounds, valued at $779,000 (foreign value), compared with 2 million pounds, valued at $1.1 million, in 1948, and 2.6 million pounds, valued at $530,000, in 1947. In terms of quantity, Belgium, the United Kingdom, and Germany were the principal U. S. suppliers in 1949; small quantities came also from France, Canada, Switzerland, Australia, the Netherlands and Italy. In terms of value, however, Germany ranked first, followed by Belgium, the United Kingdom, Switzerland, France, and Canada, in that order.

In addition to phthalic anhydride, the most important intermediates, in terms of quantity, were refined naphthalene, 450,518 pounds of which were imported, chiefly from the United Kingdom and Belgium; anthraquinone, 129,610 pounds of which were imported, chiefly from Germany; and *m*-cresol, all the 175,306 pounds imported coming from the United Kingdom. There were also substantial imports of textile assistants from Switzerland.

Imports in 1949 of coal-tar products entering under paragraph 28 of the 1930 act (finished coal-tar materials)

Once 7000 gallons was the standard capacity of a Sulphuric Acid tank car...

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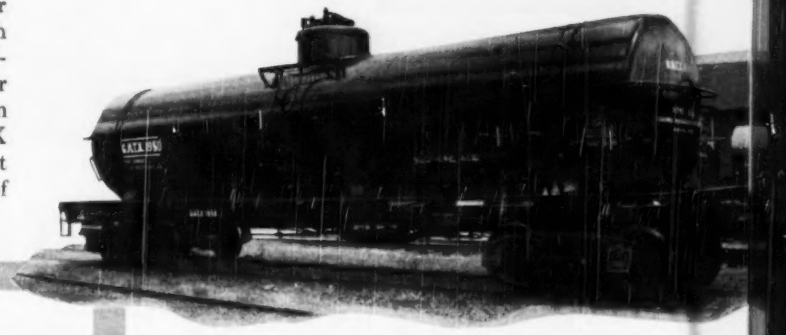
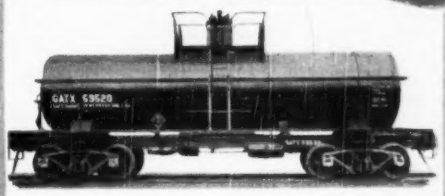
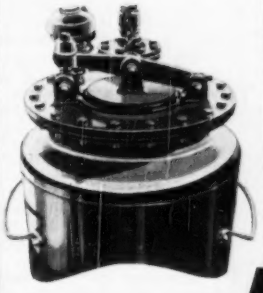
General American now makes it possible to ship up to 11,800 gallons of sulphuric acid in a single tank car. These cars are a result of the GATX program of continuous research and development for the chemical industries, through which GATX makes similar shipping economies possible for your other commodities also. More than 200 types of specialized GATX tank cars supply safe, low-cost transportation for shipments of bulk liquids.



This modern 11,800-gallon GATX sulphuric acid car is one of the largest now in service.



Shipments of smaller quantities of sulphuric acid are made economically in 7000-gallon GATX cars.



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- ☐ **Agitators for Liquids:** by Julian C. Smith, March 1949.
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totaled 1.4 million pounds, valued at $2.7 million (foreign value), compared with 1.6 million pounds, valued at $3.5 million, in 1948 and 1.4 million pounds, valued at $2.3 million, in 1947. In 1949, as in earlier years, dyes were by far the most important group of finished coal-tar products imported and came almost entirely from Switzerland. These accounted for $2.2 million, or 77.9% of the total value of all such imports, compared with $2.7 million, or 77.5% of 1948's total. Medicinals and pharmaceuticals were the next most important group of finished products imported in 1949. They came chiefly from Switzerland, the United Kingdom, and Germany and were valued at $392,000, or 14.6% of the total value of imports in this group, compared with $692,000 or 20% of the total in 1948. Among the remaining groups of finished products, imports of flavor and perfume materials declined in value to $20,000 in 1949 from $49,000 in 1948, and the miscellaneous group (chiefly synthetic resins from Canada) increased in value in 1949 to $117,000 from $34,000 in 1948.

Statistics given in the report were obtained by analyzing invoices covering imports through all U. S. customs districts.

Market Review

Rising prices and growing shortages were still the dominant factor in chemical markets over the past month. A good share of this was attributable to the labor difficulties in the alkali industry which knocked out as much as 60 per cent of capacity from production, and seriously affected chemicals all along the line. Manufacturers striving to build up inventories in anticipation of the greater pressure of war preparations or to get materials for current high production levels, multiplied difficulties.

With the prospect of increased benzene imports about the only bright spot in the aromatic picture, manufacturers' prices for these materials and their derivatives climbed. Among new prices posted were DDT, up 2¢, at 34¢ in carlots; phenolphthalein, up 10¢, to $1.10 per lb.; triphenyl phosphate, up 1¢, to 33¢ per lb. in car lots; and paranitrophenol, up 2¢, to 42¢ per lb. Betanaphthol advanced 2¢ to 32½¢ a lb., and aniline oil went up 1¢ to 16¢ a lb. Other advances saw orthotoluidin posted at 20¢ a lb.; metaphenylenediamine, at 84¢; paranitrophenol, at 42¢; acetanilide, technical, at 24½¢; paratoluidin, 61¢; dinitrochlorobenzol, 15¼¢; and dinitroaniline, 54¢. Natural phenol, both 82% and 90%, was boosted 2¢ a lb. to 14¾¢ in tankcars. Both xylol and toluol went up 2¢ to establish respective prices of 26¢ and 25¢ a gal., while one producer moved his phthalic anhydride prices up 1½¢ to make the price 18½¢ a lb. One price revision in the opposite direction was cut of ½¢ a lb. by Oronite Chemical Co. to esablish a 13½¢ a lb. price for its alkylate base for synthetic detergents.

Glycerin, which was prominent among chemicals hard to come by, shared in the general rise as the tank car price of the synthetic material advanced 4½¢ to 27½¢ a lb. f.o.b. Texas. Propylene glycol, after a 1¢ a lb. boost, was 17¢ in tank cars. Isobutyl alcohol climbed to 13½¢ a lb. in tank cars, and a single producer boosted acetaldehyde ½¢ a lb. to 10¢, tank cars. A single producer advanced coumarin to 25¢ per lb. Quicksilver advanced $5 to establish the price per flask at $77.

Mounting costs for molasses were largely responsible for a general advance of 6¢ a gal. in ethyl alcohol, as the tankcar price for tax-free material was established at 45¢ a gal. Competition from the feed industries has boosted the price of molasses to about 15¢ a gal., and this caused a swing to grain on the part of fermentation producers. Butyl alcohol has gone up 1¢ to 13¢ a gal. in tankcars, and one producer reportedly quoted butyl acetate and butyl alcohol at 28¢ and 27¢ a gal., respectively, reflecting a pure grain alcohol price of 75¢. Glacial acetic acid was advanced ½¢ a lb. to a tankcar price of 8¢, but one producer is quoting the material in tankcars at 9.6¢.

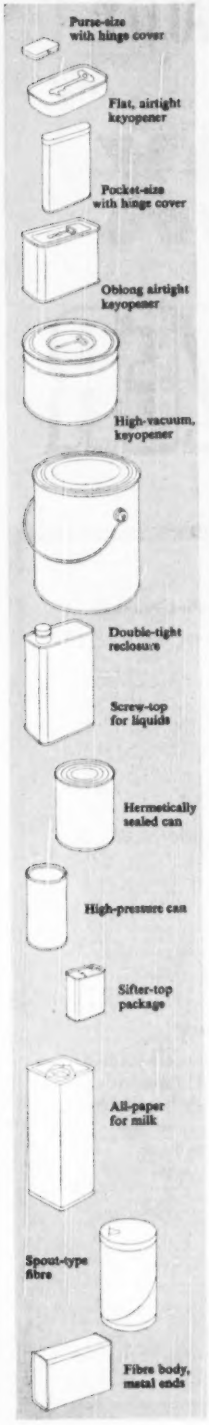
Rising costs in basic materials resulted in general increases in plasticizers. Increases among the phthalates were as follows: dibutyl, up ¾¢, to 28¼¢; dimethyl, up 1¢, to 23¢; diphenyl, up 2¢, to 45¢; and diethyl, up 2¢, to 24¢, all prices per lb. in tankcars except diphenyl phthalate which is in carlots. Advances in cresylic acid and phosphoric acid resulted in a 2¼¢ a lb. increase in tricresyl phosphate, making the tankcar price 32½¢. The latter material was quite short with demand continuing high.

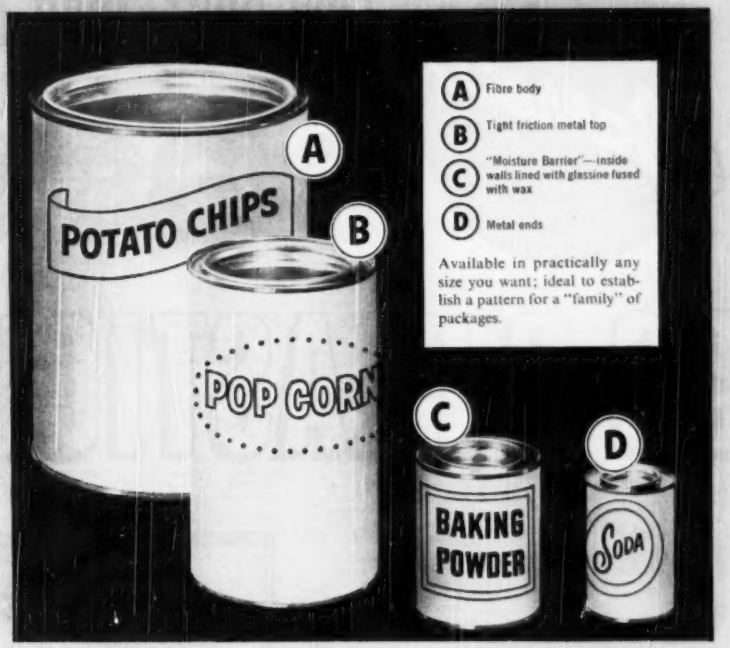
In addition to higher prices caused by the upward trend in solvents, paint producers had to pay more for their pigments. Supply conditions in pigments were severe, and little improvement could be envisioned. Among latest pigment prices per lb. were 14¾¢ for zinc oxide, lead free, American process; 15¢ for zinc oxide, red seal, French process; 26¢ for zinc yellow; 15¾¢ for dry red lead; 14¾¢ for litharge; 18.1¢ for orange mineral; 15½¢ for white lead, basic carbonate; 14¼¢ for white lead, basic sulphate; 14½¢ for 35% leaded zinc oxide; and 14⅜¢ for 50% leaded zinc oxide. Shellac, too, continued to advance, establishing these prices: Button No. 1, 48¢ a lb.; bleached bone dry, 53¢; super fine orange, 45¢; No. 1 lemon, 49¢; and No. 2 lemon, 47¢.

Under strong demand, waxes advanced to establish carnauba No. 1 at $1.12; ouricury crude at 80¢; candelilla crude at 60¢; and beeswax at 48c, all per lb. Gum tragacanth also advanced, with No. 1 selling at $3; No. 2, at $2.30; and No. 3 at $2 per cwt.

Other advances in the market saw the first change in lead acetate since last fall as the price rose 1¼¢, to 21¢ a lb. for 100-lb. bags. Red phosphorous, both powdered and granular, at 39¢ pr lb., represented a 6¢ advance.

WHICH PACKAGE SUITS YOUR PRODUCT?





WANTED: New customers for a top-notch salesman!

The inside walls of this container are lined with glassine fused with wax to provide a barrier that keeps inside moisture in . . . and outside moisture out.

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In the drug field you can make quite a list, too. It's ideal for bath salts, epsom salts, bicarbonate of soda, insecticides, boric acid, senna leaves, sulphur powder, sodium fluorite, flaxseed and Glauber's salt. In other words, it's a possibility for quite a few dry pharmaceutical products and proprietary remedies.

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There's plenty of "front" for your label and it has a tight friction metal top (easy to open—closes snug) with a wide aperture for free pouring or dispensing.

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50-B* PLASTICIZER

Barrett "ELASTEX" "50-B" Plasticizer is one of the most economical of all quality plasticizers. Compounds prepared with this plasticizer possess desirable properties such as ... water resistance ... stability to discoloration under heat and light ... toughness ... oil resistance ... firm hand ... tear resistance ... low migration ... good electrical properties ... excellent compatibility.

Profitable uses for Barrett "ELASTEX" "50-B" Plasticizer are suggested by the following formulations:

Vinyl Film, Sheeting and Extruded Products

A typical formulation for low cost, good quality material is:

Polyvinyl chloride resin	100
"ELASTEX" "50-B" Plasticizer	30
Fatty Acid Ester	10
Tricresyl Phosphate	10
Stabilizer Blend	4
	154

A typical formulation for a superior quality product is:

Polyvinyl chloride resin	100
"ELASTEX" "50-B" Plasticizer	10
"ELASTEX" 10-P or 28-P Plasticizer	22.5
Fatty Acid Ester	10
Tricresyl Phosphate	7.5
Stabilizer Blend	4
	154

Plastisol Formulations

The following is a low cost, general purpose plastisol formulation in which "ELASTEX" "50-B" Plasticizer is used as a partial replacement for the octyl phthalates. Plasticizer cost is reduced, and at the same time the flow properties of the plastisol and the oil resistance, water resistance, and tear resistance of the film are improved.

Paste resin	100
"ELASTEX" "50-B" Plasticizer	30
"ELASTEX" 10-P Plasticizer	20
Fatty Acid Ester	20
Stabilizer Blend	2
	172

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Abstracts of United States Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

U. S. Patents from Official Gazette—Vol. 633, No. 4 (April 25) and Vol. 634, Nos. 1, 2, 3 (May 2-16)

Petroleum

Preparing a rosin soap grease by heating a mixture of hydrocarbon oil, rosin, and a modified rosin of the group consisting of dehydrogenated rosin, hydrogenated rosin, and mixtures thereof, and subsequently saponifying the solution with a saponifying agent, selected from the group consisting of an alkali metal base, an alkaline earth base, and mixtures thereof. 2,505,222. Standard Oil Co., Indiana.
2,505,614. Shell Development Co.

Breaking petroleum emulsions of the water-in-oil type, by subjecting the emulsion to a demulsifying agent comprising a hydrophile pyrolytic esterification product derived by reaction between an acidic triricinolein ester of a dicarboxy acid having not over 10 carbon atoms, and a polyalkylene glycol. 2,505,824. Petrolite Corp., Ltd.

Breaking petroleum emulsions of the water-in-oil type, by subjecting the emulsion to a demulsifying agent comprising a hydrophile pyrolytic esterification product derived by reaction between an acidic ricinoleic acid-polycarboxy acid-glycerol ester; and a polyalkylene glycol. 2,505,-825. Petrolite Corp., Ltd.

In manufacture of carburetted combustible gas, the process which comprises continuously passing a gaseous mixture of oxygen-containing combustion-supporting gas and an endothermic gas-making fluid into an ignited bed of solid fuel. 2,505,894. United Engineers & Constructors, Inc.

Solid paraffin wax composition of increased tensile strength consisting of paraffin wax and aluminum stearate. 2,506,059. Gulf Research & Development Co.

Production of diolefins and motor fuel from carbon monoxide and hydrogen. 2,506,065. Phillips Petroleum Co.

Diesel fuel consisting of hydrocarbon Diesel oil blended with a cetane improving quantity of polyolefin derived by polymerization of lower olefins which has been sulfurized with elemental sulfur. 2,506,089. Sinclair Refining Co.

Catalytic synthesis of hydrocarbons from hydrogen and carbon monoxide. 2,506,221. Hydrocarbon Research, Inc.

In the catalytic reaction of a mixture of carbon monoxide and hydrogen for the production of hydrocarbons, the improvement which comprises passing said mixture in contact with a finely divided solid particle catalyst comprising stainless steel containing approximately 18% chromium and 8% nickel activated by a codium compound. 2,506,226. Hydrocarbon Research, Inc.

In preparation of an airblown polymerized asphalt containing a residue of polymerization-promoting metallic salts, the step of inhibiting undesirable scumming and hardening by incorporating a basic material selected from the group consisting of calcium and magnesium oxides and hydroxides. 2,506,283. California Research Corp.

Separating hydrocarbon mixtures by selectively reacting mercuric acetate with a mixture consisting essentially of isomeric polyalkyl benzenoid hydrocarbons including ortho, meta, and para isomers, whereby the meta isomers preferentially form the mercuric acetate compound and the ortho and para isomers remain essentially unreacted. 2,506,289. Standard Oil Development Co.

Catalytic cracking of hydrocarbons which comprises separating a wide boiling range hydrocarbon oil into a low boiling fraction and a higher boiling fraction, by passing the low boiling fraction through a first cracking zone containing powdered synthetic silica alumina catalyst, separating high octane gasoline from the cracked products, mixing powdered hot regenerated acid treated bentonite clay catalyst with higher boiling fraction. 2,506,291. Standard Oil Development Co.

Method for regeneration of a hydrocarbon synthesis catalyst. 2,506,302. Standard Oil Development Co.

Mineral lubricating oil containing a metal salt of an organo-substituted thiophosphoric acid obtained by reacting phosphorus pentasulfide with a mixture of wax-phenol and an aliphatic alcohol. 2,506,310. Standard Oil Development Co.

Low ash content lubricating oil containing an oil miscible metal salt of the condensation product of an aldehyde and an aromatic hydroxy compound and an oxidation-inhibiting quantity of an oil-soluble, relatively stable aromatic amine anti-oxidant. 23,229. Standard Oil Development Co.

Mineral oil composition comprising a mineral oil fraction having in admixture an acidic, phosphorus- and sulfur-containing reaction product of a wax-substituted phenol which inhibit said oil fraction against oxidation. 2,506,570. Socony-Vacuum Oil Co., Inc.

Mineral lubricating oil containing an additive to inhibit corrosion, lacquer and sludge formation, said additive being the reaction product of a phosphorus sulfide and saturated amine having at least 12 carbon atoms in the molecule and at least one hydrogen directly attached to the nitrogen and reacting with a nitrogen base to form an oil dispersible reaction product. 2,506,572. Standard Oil Co., Ind.

Lubricant comprising an oil dispersible reaction product of an unsaturated organic amine of 12 to 18 carbon atoms having at least one olefinic double bond and having at least one amine hydrogen and a phosphorus sulfide. 2,506,573. Standard Oil Co., Ohio.

Lubricating composition comprising an oil dispersible reaction product of a saturated aliphatic ketone having at least 12 carbon atoms with a sulfide of phosphorus and having an added element of the sulfur family reacted therein. 2,506,597. Standard Oil Co., Ohio.

Hydrocarbon conversion with metal halide catalysts. 2,506,720. Phillips Petroleum Co.

Hydrocarbon motor fuel containing an organo arsonic acid. 2,506,847. Standard Oil Co., Indiana.

Preparing an addition agent for mineral oil lubricant by reacting an octyl phenol with the octyl phenol of a sulfur chloride and the octyl phenol of phosphorus sesquisulfide. 2,506,900. Gulf Oil Corp.

Preparing an addition agent for mineral oil lubricants by reacting an octyl phenol with the octyl phenol of a sulfur chloride and the octyle phenol of phosphorus sesquisulfide, forming a neutral aluminum salt of the reaction product, and condensing the neutral aluminum salt with formaldehyde. 2,506,901. Gulf Oil Corp.

Preparing an addition agent for mineral oil lubricants by reacting an actyl phenol with the octyl phenol of a sulfur chloride and the octyl phenol of phosphorus sesquisulfide, forming a neutral stannous salt of the reaction products, and condensing the neutral stannous salt with formaldehyde. 2,506,902. Gulf Oil Corp.

Grease composition comprising a mineral lubricating oil thickened to a grease by a soap, and a higher fatty mono-carboxylic acid ester of a fusible, soluble mono-alkylated phenol-formaldehyde condensation product. 2,506,905. Gulf Oil Corp.

Grease composition comprising a mineral lubricating oil thickened to a grease by a soap, and a neutral condensation product of formaldehyde and a higher fatty mono-carboxylic acid ester of a mono-alkylated phenol. 2,506,906. Gulf Oil Corp.

Conversion of hydrocarbons with silica-alumina catalyst. 2,506,923. Universal Oil Products Co.

Composition comprising a mineral oil and a corrosion-inhibitor. 2,507,055. Gulf Oil Corp.

Bituminous composition having improved hardening resistance comprising asphalt containing an oxide of the group consisting of selenium oxide and tellurium oxide. 2,507,070. Shell Development Co.

Producing lubricating oil from naphtha containing olefins and contaminated with oxygenated and other objectionable organic compounds by contact with a hydrogen halide. 2,507,103. Standard Oil Development Co.

Cracking heavier, higher boiling hydrocarbons with a catalyst consisting of anhydrous ammonium fluoride. 2,507,220. Sinclair Refining Co.

Recovery of boron fluoride in the conversion of organic materials by a catalyst consisting of boron trifluoride and hydrogen fluoride. 2,507,499. Phillips Petroleum Co.

Production of normally liquid hydrocarbons by passing hydrogen and carbon monoxide into a reaction zone into contact with a catalyst consisting of titanium boride. 2,507,510. Hydrocarbon Research, Inc.

Conversion of hydrocarbons. 2,507,523. Houdry Process Corp.

Breaking petroleum emulsions of the water-in-oil type, by the action of a demulsifier including a hydrophile, hydroxypolyalkoxy compound obtained by the action of an alkylene oxide on an artificial wax which consists essentially of the reaction product of stearic acid, maleic anhydride and a polyhydric alcohol selected from the group consisting of pentaerythritol, polypentaterythritols and mixtures thereof. 2,507,560. Petrolite Corp., Ltd.

Catalyst prepared by calcining a silica gel-magnesia composite impregnated with an ammonium phosphate for conversion of hydrocarbons. 2,507,625. Universal Oil Products Co.

Solvent refining of light oils with furfural saturated with water, 2,507,-861. Texas Co.

Breaking petroleum emulsions of the water-in-oil type, by the action of a demulsifier including a hydrophile oxyalkylated synthetic resin prepared by the oxyalkylation of an oxyalkylation-susceptible, infusible synthetic resin by means of an alpha-beta alkylene oxide having not more than 4 carbon atoms. 2,507,910. Petrolite Corp., Ltd.

Upgrading of motor fuels by catalytic treatment with hydrogen with an impregnated molybdenum oxide-alumina catalyst promoted with silica and zinc oxide. 2,508,014. Shell Development Co.

Refining a hydrocarbon mixture containing normal paraffinic hydrocarbons and other hydrocarbons, by treating with an anhydrous mixture of sulfuric and phosphoric acids. 2,508,038. Shell Development Co.

Photographic

Pressure sensitive record material with a mark of distinctive color produced by application of localized pressure, one of said color-forming reactants being the organic compound 3,3 bis(p-dimethylaminophenyl) phthalide. 2,505,472. National Cash Register Co.

Pressure sensitive record material with a mark of distinctive color produced by application of localized pressure, one of the color-forming reactants is the compound 2,4 bis (p-(p-dimethylaminophenylazo) anilinol 6-hydroxy sym, triazine. 2,505,473. National Cash Register Co.

Pressure-sensitive record material with a mark of distinctive color produced by application of localized pressure, one of the color-forming reactants being the organic compound o-hydroxybenzalacetophenone. 2,505,474. National Cash Register Co.

Pressure sensitive record material whereby a mark of distinctive color is produced by mere application of localized pressure, one of said color reactants being an organic compound, 3,3 bis (p-dimethyl amino phenyl) methane. 2,505,475. National Cash Register Co.

Pressure sensitive record material whereby a mark of distinctive color is produced by mere application of localized pressure, one of said color-forming reactants being 3,3 bis (p-dialkylamino-phenyl) phthalide. 2,505,476. National Cash Register Co.

Pressure sensitive record material where by a mark of distinctive color is produced by mere application of localized pressure, one of said color-forming reactants being 3,3 bis(p-monoalkylamino-phenyl) phthalide. 2,505,477. National Cash Register Co.

Pressure sensitive record material whereby a mark of distinctive color is produced by mere application of localized pressure, one of the color-forming reactants being the organic compound 2(4,4' bis dimethylamino-benzohydryl) 5 dimethylamino-benzoic acid. 2,505,478. National Cash Register Co.

Pressure sensitive record material whereby a mark of distinctive color is produced by mere application of localized pressure, one of said color-forming reactants being the organic compound 3,3 bis(4-dimethylamino 3-methyl phenyl) phthalide. 2,505,479. National Cash Register Co.

Pressure sensitive record material whereby a mark of distinctive color is produced by mere application of localized pressure of the color-forming reactants being the organic compound 4'-(p-dimethylaminophenylazo) benzanilide. 2,505,480. National Cash Register Co.

Making pressure sensitive record material, with reactants so selected as to react to form a distinctive color when brought into contact with each other, one of said color-forming reactants being 3,3 bis(p-dimethylaminophenyl) phthalide. 2,505,481. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound, said reactants so selected as to react, to form a distinctive color when brought into adsorption contact with each other, one of the color-forming reactants being the compound 2,4-bis [p-(p-dimethylaminophenylazo) anilino] 6 hydroxy sym. triazine. 2,-505,482. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound so selected as to react, to form a distinctive color when brought into adsorption contact with each other, one of the color-forming reactants being o-hydroxybenzalacetophenone. 2,505,483. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound to form a distinctive color when brought into adsorption contact with each other, one of the color-forming reactants being a compound having the structure 3,3 bis(p-dimethylamino methane). 2,505,484. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound so selected as to react to form a distinctive color, one of said color-forming reactants having the structure 3,3 bis(p-dialkylaminophenyl) phthalide. 2,505,485. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and organic compound 3,3 bis(p-monoalkyl-amino phenyl) phthalide. 2,-505,486. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound, 2(4,4' bis dimethylaminobenzohydryl) 5 dimethylaminobenzoic acid. 2,505,487. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound, 3,3 bis(4-dimethylamino 3-methyl phenyl) phthalide. 2,505,488. National Cash Register Co.

Making pressure sensitive record material from an inorganic compound and an organic compound, 4'-(p-dimethylaminophenylazo) benzanilide. 2,505,489. National Cash Register Co.

Elimination of preservative sulfite from photographic developers prior to use in color development. 2,506,622. Technicolor Motion Picture Corp.

Color forming photographic development utilizing amino-N-hydrocarbon substituted beta-amino acrylamide couplers. 2,507,110. E. I. du Pont de Nemours & Co.

Direct positive photographs using color developers by development in the following internal type developer, hydroquinone, monomethyl-p-aminophenol sulfate, anhydrous sodium sulfite, potassium bromide, sodium hydroxide, sodium thiosulfate, and water. 2,507,154. Eastman Kodak Co.

Color-forming photographic developer comprising a primary aromatic amino developing agent and a coupler compound having the formula: HO-R-NHCOCH$_2$CN where R is selected from the group consisting of aromatic nuclei of the benzene and naphthalene series and the position in the aromatic nucleus para to the hydroxyl group contains a substituent of the class consisting of hydrogen and a replaceable group. 2,507,180. Eastman Kodak Co.

Dry powder composition for preparation of an acid quinone bleach bath by mixing with water, comprising hydroquinone, sodium hydrogen sulfate, and potassium dichromate. 2,507,183. Eastman Kodak Co.

Polymers

Preparing a synthetic resin by heating rosin with lactic acid then heating the product with pentaerythritol. 2,504,989. U.S.A. as represented by the Secretary of Agriculture.

Photopolymerization comprising adding to an ethylenically unsaturated photopolymerizable resinophor a photopolymerization catalyst consisting of a haloalkyl substituted polymuclear aromatic compound, in which the halogen is in the 1 position in the alkyl substituent, and exposing the same to irradiation by actinically active light to polymerize the resinophor. 2,505,067. Alexander H. Kerr & Co.

Photopolymerization comprising dispersing in an ethylenically unsaturated photopolymerizable resinophor a photopolymerization catalyst consisting of halomethyl napthalene and irradiating the same by actinic light. 2,505,068. Alexander H. Kerr & Co.

Haze-free light-polarizing sheet comprising molecularly oriented polyvinyl alcohol having incorporated therein the transparent, highly dichroic, heat-stable, molecularly oriented, water-insoluble product comprising polyvinyl alcohol, sulfide ions and ferric ions. 2,505,080. Polaroid Corp.

Haze-free light-polarizing sheet comprising molecular oriented polyvinyl alcohol having incorporated therein the transparent, highly dichroic, heat-stable, molecularly oriented, water-insoluble product comprising polyvinyl alcohol, sulfide ions and ions of at least one of the metals from the group consisting of cobalt and nickel. 2,505,081. Polaroid Corp.

Haze-free light polarizing sheet comprising molecularly oriented polyvinyl alcohol having incorporated therein the transparent, highly dichroic, heat-stable, molecularly oriented, water-insoluble product comprising polyvinyl alcohol, sulfide ions and molybdenum ions. 2,505,082. Polaroid Corp.

Haze-free light-polarizing sheet comprising molecularly oriented polyvinyl alcohol having incorporated therein the transparent, highly dichroic, heat-stable, molecularly oriented, water-insoluble product comprising polyvinyl alcohol, selenide ions and ions of at least one of the metals from the group consisting of bismuth and lead. 2,505,083. Polaroid Corp.

Haze-free light-polarizing sheet comprising molecular oriented polyvinyl alcohol having incorporated therein the transparent, highly dichroic, heat-stable, molecularly oriented, water-insoluble product comprising polylvinyl alcohol, sulfide ions and ferrous ions. 2,505,084. Polaroid Corp.

Light-polarizing, molecularly oriented, transparent, high polymeric plastic containing dichroic dithio-oxamide stain. 2,505,085. Polaroid Corp.

Copolymer of a vinylthiophane and a diolefinic compound. 2,505,204. Standard Oil Co., Indiana.

Making a microporous resinous solid product by forming a mixture of an esterification product of an ethylenic alpha, beta-dicarboxylic acid with a glycol. 2,505,353. U. S. Rubber Co.

Polymeric composition from divinyl sulfone. 2,505,366. U. S. Rubber Co.

In making resinous products, the step of replacing chlorine in silicon oxychloride with a hydrocarbon group by reacting silicon oxychloride Si_2OCl_6 with an organo magnesium halide. 2,505,431. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

Molding composition which comprises lignocellulose and binder, said binder comprising a phenol-aldehyde resin, and sulfur. 2,505,782. Plywood Research Foundation.

Recovery of acetone-insoluble polysulfone resins from the sulfur dioxide solutions thereof obtained on reacting an unsaturated olefinic hydrocarbon with excess sulfur dioxide, which comprises adding a weak precipitant, selected from the group consisting of acetone, methyl ethyl ketone, ethyl acetate, butylacetate, benzene and toluene. 2,505,830. Celanese Corp. of America.

Production of resinous reaction products, by introducing gaseous oxygen into an unsaturated liquid hydrocarbon containing an olefinic linkage in excess of that required to form a catalytic amount of the peroxide of the hydrocarbon, removing such excess of oxygen and reacting said oxygen-treated hydrocarbon with liquid sulfur dioxide. 2,505,833. Celanese Corp. of America.

Copolymerizing a castor-oil maleate ester with monoolefinic compound in the presenc of carbon tetrachloride and an organic peroxidic polymerization catalyst. 2,505,844. U. S. Rubber Co.

In recovering a resin from a resin-bearing coal the steps which comprise, separating the soluble resin content in the form of a clear isohexane solution, diluting with isohexane, and recovering the precipitated resin. 2,505,865. Interchemical Corp.

Polyvinyl acetal resin and a still residue obtained as a by-product in the process by heating a compound taken from the group consisting of benzene and mixtures thereof with toluene and xylene to temperatures at which diphenyls and terphenyls are formed, distilling, chlorinating the resultant residue and distilling the chlorinated mixture to remove pure chlorinated diphenyls and chlorinated terphenyls, said still residue consisting of chlorinated polyphenyl compounds taken from the group consisting of chlorinated tri-ortho-phenylene and chlorinated diphenyl benzene polymers. 2,506,014. Monsanto Chemical Co.

Recovering refined resins from coal by solvent extraction. 2,506,300. Combined Metals Reduction Co.

Recovery of resins from coal. 2,506,301. Combined Metals Reduction Co.

Preparing solutions of mixtures of siloxane resin and polyvinyl acetal resin, with cresylic acid as one of the solvents. 2,506,320 Anaconda Wire and Cable Co.

Thermosetting resin from a diphenol and a diglycidyl ether of a diphenol. 2,506,486. Union Carbide and Carbon Corp.

Thermal-reversible aqua-gel, containing a water soluble polyvinyl alcohol and an interpolymeric product obtained from a compound selected from the group consisting of acrylic acid and α-substituted acrylic acids with an amide of said acids. 2,506,537. General Aniline & Film Corp.

Preparing organo silicon derivatives by subjecting an alkoxy hydrocarbon silane to the action of dry oxygen blown therethrough until a polymaric organic silicon derivative is obtained. 2,506,616. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

Alpha, omega-bis(2-chloroethoxy) polymethyipolysioxanes. 2,506,678. Interchemical Corp.

Polymerization of a conjugated diolefin, by polymerizaing in the presence of a finely divided alkali metal catalyst in admixture with a low-boiling inert diluent and a surface active agent, said surface active agent comprising an alkaline earth metal salt of a fatty acid containing at least 12 and not more than 20 carbon atoms per molecule. 2,506,857. Phillips Petroleum Co.

In processing a fusible copolymeric resin, prepared from a mixture containing a multi-olei, having from 4 to 14 carbon atoms per molecule, a monoolefin, having from 5 to 20 inclusive carbon atoms per molecule, by a Friedel-Crafts catalyst, the steps of diluting the polymerized mixture with warm, light naphtha to volatilize out unpolymerized material, washing the naphtha solution with mildly alkaline water solution; passing the naphtha solution over a heated metal surface containing less than 7% iron. 2,507,100. Standard Oil Development Co.

Friedel-Crafts catalyzed low-temperature polymerization of isoolefins. 2,-507,105. Standard Oil Development Co.

Condensation product of stearoyl phenol with sulfur dichloride. 2,507,111. Standard Oil Development Co.

Polymerization process by mixing vinyl isobutyl ether and as a diluent a nitrite ester having from 1 to 5 carbon atoms and polymerizing in the presence of by the application of a Friedel-Crafts catalyst in solution. 2,507,133. Standard Oil Development Co.

Improving the properties of the product of the polymerization of a composition comprising a substance containing a halogen atom and a polymerizable carbon-to-carbon double bond by subjecting it to intimate contact with an inorganic peroxide and a metal salt of an acid stronger than metaboric acid. 2,507,142. Stabelan Chemical Co.

Improving the properties of the product of the polymerization of a composition whose molecule contains a polymerizable olefinic double bond by intimate contact with an inorganic peroxide and a salt of a metal of group II of the periodic table having atomic weight between 85 and 140 with an acid not stronger than metaboric acid. 2,507,143. Stabelan Chemical Co.

Acyloxyvinyl alkyl sulfones and polymers thereof. 2,507,147. Eastman Kodak Co.

Refining and removing occluded monomers from copolymeric beads of isopropenyl acetate and a fumaric acid alkyl ester, said alkyl groupebing saturated and having not more than 3 carbon atoms, by soaking with a liquid mixture of methanol and water. 2,507,153. Eastman Kodak Co.

N-acyl derivatives of polyvinylamines. 2,507,181. Eastman Kodak Co.

Condensation products of furfural and monohydroxy benzenes 2,507,199. General Electric Co.

Making Copolymers by forming a mixture of alpha-vinyltetrahydronaphthalene and styrene and heating until a hard, clear, colorless copolymer is formed. 2,507,209. General Electric Co.

Linear chloromethylmethyl siloxanes. 2,507,516. Dow Corning Corp.

Polymerization of alpha alkyl styrenes by contacting a solution of said alpha alkyl styrene in a liquefied normal monoolefin having 2 to 4 carbon atoms with a Friedel-Crafts catalyst. 2,507,338. Atlantic Refining Co.

Preparing resinous materials by hydrolyzing by water alone, the halogen only of a silicochloroform derivative containing a silicon-hydrogen bond while blowing air therethrough until a resinous material is obtained. 2,507,414. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

Preparing organo silicon derivatives by subjecting an ester of a silicic acid selected from the group consisting of the esters of orthosilicic acid and the ortho esters of silicoformic acid, the grouping forming the ester with the acid radical being monohydroxy to the action of substantially dry oxygen until a polymeric derivative retaining organic groups from the ester is obtained and discontinuing the reaction. 2,507,422. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

Monofunctional polysilahydrocarbons. 2,507,512. Dow Corning Corp.

Polyorganosiloxanes. 2,507,519. Dow Chemical Corp.

Reacting in liquid phase an organichlorosilane with the complex formed by reacting metallic aluminum with methylene chloride, to produce an organo-Silicon polymer in which the silicon atoms are interconnected by methylene radicals. 2,507,521. Dow Corning Corp.

Azo catalysts in the preparations of olefin-sulfur dioxide resins. 2,507,526. E. I. du Pont de Nemours & Co.

Interpolymers of esters of azobisformic acid. 2,507,718. E. I. du Pont de Nemours & Co.

In catalytic polymerization of a C_5 olefin, the method comprising passing said olefin in contact with a synthetic gel of the acid treated zeolite type having the approximate composition $Al_2O_3.5SiO_2$ free from alkali metal and containing a small amount of nickel oxide. 2,507,864. Texas Co.

Interpolymers of allyl alcohaol and alkyl diesters of an alpha-unsaturated dicarboxylic acid. 2,507,871. U. S. Rubber Co.

Regenerating a partially exhausted anion exchange resin of the amine-aldehyde type by passing an aqueous slurry of solid calcium hydroxide particles upwardly through a porous bed of said resin, and then washing by passing water therethrough to effect the removal of excess calcium hydroxide. 2,507,992. Pacific Chemical & Fertilizer Co.

Composition matter comprising normally solid polyvinyl butyral and a fusible thermosetting resin, said resin selected from the group consisting of resinous acid condensation reaction products of furfuryl alcohol and formaldehyde and resinous acid condensation reaction products of formaldehyde and fusible acid condensation-polymerization products of furfuryl alcohol. 2,508,025. Harvel Research Corp.

Preparing an organosiloxane by hydrolyzing and partially condensing an organosilano having only monovalent hydrocarbon and readily hydrolyzable groups attached to silicon, the hydrolysis and condensation being effected in a mixture of the organosilane, a hydrocarbon solvent, water and a strong mineral acid to produce a dilute aqueous solution with the water, separating the hydrocarbon solvent containing the partially condensed organosiloxane, thereafter preparing a solution of the partially condensed organosiloxane and an organic solvent, admixing at least one aqueous dehydrating mineral acid selected from the group consisting of sulfuric acid and phosphoric acid, whereby the hydroxyl groups in the organosiloxane molecules are removed without substantial change in viscosity of the solium having the same concentration of organosiloxane. 2,508,196. Westinghouse Electric Corp.

Copolymer of 2-cyano-3-methyl butadiene-1,3 and butadiene-1,3. 2,508,226. Wingfoot Corp.

Preparing a stable aqueous emulsion containing a polymerized normally liquid, water-insoluble polymerizable compound containing a terminal ethylene group, which comprises carrying out the polymerization while dispersed in an aqueous medium containing water, a non-polymerizable surface tension depressant, a hydrophilic colloid and a water soluble per compound to supply available oxygen. 2,508,341. Shawinigan Resins Corp.

Preparing a stable aqueous emulsion of polyvinyl acetate which comprises polymerizing vinyl acetate while dispersed in an aqueous medium containing water, hydroxy ethyl ceilulose, a non-polymerizable surface tension depressant characterized by containing an alkali metal sulfonate of an alkyl aryl hydrocarbon, and a water soluble persulfate. 2,508,342. Shawinigan Resins Corp.

Preparing a stable aqueous emulsion of polyvinyl acetate by polymerizing vinyl acetate while dispersed in an aqueous medium containing water gum arabic, a non-polymerizable surface tension depressant characterized by containing an alkali metal sulfonate group and 10-20 carbon atoms and a water soluble per compound to supply available oxygen. 2,508,343. Shawinigan Resins Corp.

Rubber

Preparing a homopolymer of chloroprene suitable for the preparation of polychloroprene crepe rubber, by carrying out the polymerization in an alkaline aqueous emulsion in the presence of an acid stable dispersing agent and an alkali salt of a rosin acid, and incorporating in the polymer dispersion, after polymerization is completed, a tetraalkyl thiuram sulfide, acidifying the latex, coagulating, washing and drying the resulting polymer. 2,505,226. E. I. du Pont de Nemours & Co.

Sensitizing and molding latex, by subjecting ammoniated latex to the action of pancreatic extract for degrading the proteins, retaining the degradation products of the proteins in said latex, allowing to ripen, then adding zinc oxide in the form of an aqueous dispersion, pouring the mixture thus formed into a mold and allowing said mixture to gelify. 2,505,229. Societe a Responsabilite Limitee dite: Societe Auxiliaire de l'Institut Francais du Caoutchouc.

Hard, tough, thermoplastic homogeneous mixture of a rubbery copolymer of 35 to 48% of acrylonitrile and butadiene-1,3, a rubber copolymer of from 18 to 26% of acrylonitrile, and a hard normally inelastic resinous thermoplastic copolymer of styrene and acrylonitrile. 2,505,349. U. S. Rubber Co.

Preserving rubber by incorporating the product obtained by condensing, in the presence of an acidic condensation catalyst, a vinyl aromatic compound with a dihydric phenol. 2,506,410. Monsanto Chemical Co.

Preparation of oil resisting derivatives of rubber by reacting aliphatic chlorothiol acids with rubber in solution and isolating the product, said acid having the general formula $HSCOCX_nH$ in which X is chlorine and n is from 1 to 3. 2,506,997. British Rubber Producers Research Ass'n.

Preparing rubber-like materials by hydrolyzing with water the halogen only in a compound having the formula $RySiHX_{3-y}$, where R is a monovalent hydrocarbon radical, X is a halogen, and heating the hydrolyzed product while blowing air therethrough until a polymerized product is obtained. 2,507,413. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

Specialties

Making a low viscosity, anhydrous electrolyte for electrolytic condensers by mixing boric acid with ethylene glycol, cooling and then passing ammonia gas therethrough. 2,505,180. General Motors Corp.

Welding flux consisting of sodium tetraborate, neutral sodium fluoride, and sodium hydroxide. 2,505,291. Ernest H. Lucas and John J. Shea.

Suppressing the corrosive action of an aqueous liquid on a metallic surface by introducing into such aqueous liquid, a gelatinous substance selected from the group consisting of gelatin and an analogous animal glue material, and a tanning agent selected from the group consisting of the bichromates of zinc and manganese. 2,505,535. Societe De Produits Chimiques Des Terres Rares.

Cleaning and tinning electrical conductors insulated with a film of acetone-insoluble polyvinyl acetal synthetic resin by treating with molten pyrogallol and then applying molten solder. 2,505,627. Radio Corp. of America.

In producing water-repellency agents, heating a polymethylol melamine in an alcohol solution, containing hydrochloric acid with a methylol fatty acid amide, mixtures of methylol fatty acid amides, and the alkyl ethers of the methylol fatty acid amides formed with a water soluble alcohol of the glass consistency of primary and secondaryalcohols, the fatty acid group of the amide in each case being of a saturated fatty acid containing from 14 to 22 carbon atoms. 2,505,649. E. I. du Pont de Nemours & Co.

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Protecting a metallic surface against corrosion by applying a coat of a solution containing a gelatinous substance selected from the group consisting of gelatin, bone glue, hide glue and fish glue, and containing a tanning agent which is a soluble bichromate of a metal selected from the group consisting of zinc and manganese. 2,505,734. Herbert Manfred Freud, also known as Jean Frasch.

Screen oil composition consisting of a solvent and a polybutene. 2,505,740. Harshaw Chemical Co.

Printing ink comprising pigment dispersed in a vehicle, which comprises a solution of a resin in a petroleum hydrocarbon, the resin comprises the fraction of Utah coal resin which is precipitated on dilution of a 25-45% solution of the coal resin in isohexane to 10% concentration with isohexane. 2,505,866. Interchemical Corp.

Oil-in-water emulsion of a synthetic wax comprising N,N-dihydrozyethyl aryl sulfonamide diester of a higher fatty acid, containing a cationic emulsifying agent. 2,505,931. General Mills, Inc.

Fire extinguishing foam which consists of an aqueous solution of a member of the group consisting of anionic, non-saponaceous surface-tension reducing agents and alkylphenol ethylene oxide condensation products, and a copolymer of a vinyl ether and maleic anhydride. 2,506,062. General Aniline & Film Corp.

Preparing an adhesive by mixing a rubber latex ,filler, and a bituminous emulsion. 2,506,339. Stancal Asphalt & Bitumuls Co.

Stable alkaline sulfite hair waving solution comprising an alkaline sulfite salt and an alkaline buffering salt, dissolved in water containing multivalent ions of at least one metal selected from the group consisting of copper, cobalt, manganese and iron and a sequestering agent for said ions, selected from the group consisting of water-soluble tertiary amino polycarboxylic acids and salts thereof. 2,506,492. Raymond Labs., Inc.

Preventing corrosion of metals, by applying a substituted inidazoline. 23,227.

Preventing tarnishing of the surfaces of silverware, by placing in a covering comprising a fabric of closely woven construction containing filamentary materials having a basis of a lower aliphatic acid ester of cellulose. 2,506,731. Celanese Corp. of America.

Cosmetic composition comprising a fatty base and a solution of a halogenated fluorescein in a tetrahydrofurfuryl ester. 2,506,921. Siegfried Gottfried.

Rendering a non-water-repellent material water-repellent by treating with a composition comprising an aqueous solution of a water-soluble metallic salt of a hydrocarbon-substituted silanetriol, the metal ion of said salt being a member selected from the class consisting of alkali metals and alkaline earth metals, and causing the formed hydrocarbon-substituted polysiloxane on the surface of the treated material to become water-insoluble by drying the treated material under mildly acidic conditions whereby the treated material becomes water-repellent. 2,507,200. General Electric Co.

Germicide for application to the skin of living humans and for sterilizing surgical instruments, which comprises sodium hexametaphosphate. sodium citrate, sodium carbonate, paraformaldehyde, and sulphonated castor oil, free from sulphuric acid. 2,507,236. John S. Williams.

Nylon article renedered self-sterilizing by treatment with an aryl mercuric compound. 2,507,299. Pro-phy-lac-tic Brush Co.

Brake fluid comprising a lubricant selected from the group consisting of the mono- and di-ricino-leates of the aliphatic glycols, an aliphatic glycol, 2-methyl-2, 4-pentane diol, a diluent selected from the group consisting of the propyl alcohols, the butyl alcohols, the amyl alcohols, methoxy-methoxy ethanol, and the lower mono-alkyl ethers of ethylene and glycol, diethylene glycol, propylene glycol and di-propylene glycol, corrosion inhibitor. 2,507,401. Wagner Electric Corp.

Paint remover having thixotropic properties consisting of methylene chloride, paraffin, methyl cellulose, acetic acid (glacial), formic acid (90%), and methanol. 2,507,983. Wyandotte Chemical Corp.

Paint remover composition consisting of methylene chloride and an acid selected from the group consisting of formic, acetic, propionic, salicylic, butyric, carbolic, benzoic and cinnamic acids; and water. 2,507,984. Wyandotte Chemicals Corp.

Paint remover composition consisting of a solvent selected from the group consisting of methylene chloride, ethylene dichloride, 1,1,2-trichlorethane, 1,1,2,2,-tetrachlorethane chloroform and ethylene chlorhydrin; a mixture of 90% formic acid and 100% acetic acid, and water. 2,507,985. Wyandotte Chemical Corp.

Lubricating oil for use in rolling metal consisting of an unoxidied aliphatic hydrocarbon mineral oil containing oxidied hydrocarbons existing as organic acids, alcohols and esters free from aldehydes and ketones. 2,508,016. Republic Steel Corp.

Liquid dielectric composition consisting of stilbene, diphenyl, anthracene, phenanthrene, naphthalene methylnaphthalene and dibenzyl. 2,508,099. General Electric Co.

In removing aprotective coating film from a surface therein said film is softened by the application of a liquid composition and wherein the softened film is removed, the improvement which comprises applying to said film a liquid consisting of an aromatic nitrile. 2,508,215. Socony-Vacuum Oil Co., Inc.

Preparing a cement for basing electric lamps, which comprises a mixture of aluminum sulphate an zirconium silicate with an amino silane; drying and adding water to form a mass of putty-like consistency. 2,508,327. Sylvania Electric Products, Inc.

Textiles

Increasing the tenacity of cellulose acetate yarns by stretching at least 10 times their original length in the presence of wet steam. 2,505,048. Celanese Corp. of America.

Water-repellent textile containing the reaction product of a soluble titanium compound with a long-chain fatty acid ester of a monomeric polyhydric alcohol. 2,505,259. E. I. du Pont de nemours & Co.

Increasing the strength of insolubilized artificial protein filaments, by treatment with an acidic, saline solution of formaldehyde. 2,506,253. Imperal Chemical Industries, Ltd.

Ethyl cellulose-coated textile fabric. 2,507,107. Hercules Powder Co.

Shrinkproofing wool, by immersing in an aqueous liquor containing hydrochloric acid and water-soluble bromate. 2,508,007. Rudolf Bloch, Hanna Farkas, Kurt Goldschmid, Mendel Lewin, Isaar Schnerb and Paul Goldschmidt.

*Agricultural**

Insect control composition comprising an inert vehicle and dispersed therein a dinitromethylphenol and salt of a dinitromethylphenol and ammonia. 2,509,754. Shell Development Co.

An insecticidal or insectifugal composition containing as its active ingredient 2-methyl-4-keto 1,3-benzodioxane and a carrier therefor. 2,510,036. Monsonto Chemical Co.

Rodent repellent composition which comprises beta-isothioureidopropionic acid and as a carrier an aqueous medium. 2,510,366. B. F. Goodrich Co.

Rodent and deer repellent composition comprising 6 to 25% by weight of the oily product of the reaction of three molecular equivalents of butyraldehyde with one molecular equivalent of aniline. 2,510,367. B. F. Goodrich Co.

Dust composition toxic to fleas which comprises a methyl dodecahydro acridane as the essential active ingredient. 2,510,431. B. F. Goodrich Co.

Triallyl cyanurate and insecticidal compositions containing the same. 2,510,564. American Cyanamid Co.

Fungicidal composition comprising a 4,5-pyrazoledione-4-oxime. 2,510,696. United States Rubber Co.

Fungicidal composition comprising an aqueous suspension of a 3,5-dimethy-4-nitrosopyrazole. 2,510,724. United States Rubber Co.

Fungicidal composition comprising a 3-phenyl-2,4-thiazoledione. 2,510,725. United States Rubber Co.

Herbicidal composition which comprises 2,4-dichlorophenoxyacetic acid, the remainder being a vehicle for the 2,4-dichlorophenoxyacetic acid, containing an aliphatic alcohol, cyclohexylamine sulfonate, alkali metal sulfonates, and a viscous hydrocarbon binding agent. 2,510,839. Standard Oil Development Co.

Insecticidal composition comprising 1,1-di-(4-chloro-phenyl)-2,2,2-trichloroethane and 1,1-di-(monochloro-phenyl)-ethane, and wherein the mixture of toxicants exerts a synergistic effect as regards insecticidal toxicity. 2,510,870. Dow Chemical Co.

Preparing 2,4-dichlorophenoxyacetic acid by passing chlorine gas into molten phenol until the phenol is dichlorinated, condensing the resultant mixture with mono-chloroacetic acid under alkaline conditions and acidifying. 2,511,784. Grady M. O'Neal.

Selectively eradicating weeds from carrot plots by distributing a composition consisting of alkanes and alkenes free of aromatics to effect contact of the composition with the weeds. 2,512,044. Standard Oil Development Co.

*Cellulose**

Producing highly extensible regenerated cellulose yarn by thoroughly wetting a dried regenerated cellulose yarn having high extensibility with liquid ammonia. 2,509,549. E. I. du Pont de Nemours & Co.

In making carboxymethylcellulose wherein cellulose is reacted with caustic alkali and an etherifying agent, the improvement which comprises subjecting to a mechanical mixing action, in the presence of caustic alkali and etherifying agent, a mass of comminuted cellulose. 2,510,355. Wyandotte Chemicals Corp.

Preparing a lacquer-in-water emulsion by agitating a water slurry comprising nitrocellulose, water and a water-soluble emulsifying agent with a water-immiscible volatile nitrocellulose solvent to substantially completely colloid the nitrocellulose and to form a rough lacquer-in-water emulsion and homogenizing said rough emulsion to form a stable emulsion. 2,510,834. Hercules Powder Co.

Producing cellulose xanthate by agitating a mass of particulate alkali cellulose with carbon disulfide. 2,510,984. American Viscose Corp.

Water-sensitive cellulose derivatives by mixing acrylonitrile with viscose to produce, by direct reaction of the acrylonitrile with the dissolved cellulose xanthate, a cyanoethyl cellulose xanthate, and thereafter effecting hydrolysis of substantially all of the cyanoethyl groups to carboxyethyl groups to produce a carboxyethyl cellulose. 2,511,060. American Viscose Corp.

In producing cellulose from deciduous wood by digesting the materials with a mixture of nitric acid and aqueous acetic acid and subsequently washing the materials with alkali to dissolve lignin-oxidation products, The improvement which consists in employing the nitric acid in amount 8-12% of the air-dry weight of the materials and the aqueous acetic acid in a concentration of 50-90%, and passing oxygen through the slurry of mixed acids and cellulosic material. 2,511,096. Celanese Corp. of America.

Preparation of cellulose sulfate by impregnating cotton linters with an aqueous solution containing sulfamic acid and urea, drying the wet linters, and heating. 2,511,229. E. I. du Pont de Nemours & Co.

In preparation of a cellulose ether by a reaction mixture of alkali and cellulose with an etherifying agent, by introducing a substance of the group consisting of hydrogen peroxide and metallic peroxides, and a predetermined amount of a salt of a metal of the group consisting of manganese, cobalt, iron and lead, and conducting said reaction in the presence thereof. 2,512,338. Hercules Powder Co.

Making retractile articles from solutions of cellulose triacetate in a solvent comprising glycol formal. 2,512,490. Societe Novacel.

Treating cellulose fibers with alkali metal hydroxide and copper-alkylolamine complex. 2,512,558. Chemical Labs., Inc.

*Ceramics**

Ceramic glazing composition comprising, in aqueous suspension, ceramic glaze ingredients, wax, and a material selected from the group consisting of the alkali metal and alkaline earth metal salts of ligno-sulphonic acid. 2,508,735. Socony-Vacuum Oil Co., Inc.

Dry mix for production of insulating firebrick and furnace linings comprising exfoliated vermiculite and a finely pulverized binder of hectorite. 2,509,315. Universal Zonolite Insulation Co.

Thermal insulating cement comprising inorganic fibrous material including mineral wool, an inorganic binder selected from the group consisting of the hydrophilic, solvatable alkali metal and alkaline earth metal silicates and aluminates, and sodium oxalate. 2,509,599. Baldwin-Hill Co.

Glossing crystalline corundum by treating with a fused mixture consisting of sodium carbonate and an alkali borate. 2,510,219. Linde Air Products Co.

Moisture-insusceptible, transparent, colorless fluoride glass resulting from fusion of the following fluorides: magnesium; calcium; strontium; barium; lanthanum; cerium; thorium; aluminum; beryllium. 2,511,224. Eastman Kodak Co.

Fluophosphate optical glass having high resistance to hydrofluoric acid and consisting of the fused heat-reaction product of a batch consisting of aluminum metaphosphate and compatible metal fluorides; the fluorides including magnesium fluoride; calcium fluoride; zinc fluoride; strontium fluoride; barium fluoride; and lanthanum fluoride. 2,511,225. Eastman Kodak Co.

Fluophosphate optical glass consisting of the fused heat reaction product of a batch consisting of compatible materials and containing barium fluoride, aluminum metaphosphate and cadmium fluoride. 2,511,226. Eastman Kodak Co.

Fluophosphate optical glass consisting of the fused heat reaction product of a batch containing aluminum metaphosphate; a fluoride selected from the group consisting of the fluorides of sodium and barium; a compound of lead selected from the group consisting of lead oxide and lead fluoride. 2,511,227. Eastman Kodak Co.

Optical borate glass having an index of refraction between 1.6 and 1.7 consisting of beryllium, lead, boron, silicon and the remaining oxides being compatible in the glass composition. 2,511,228. Eastman Kodak Co.

* From Vol. 634, Nos. 4, 5; Vol. 635, Nos. 1, 2, 3.

Vitreous articles consisting of a vitrified mixture of zirconium silicate, zirconia, magnesium silicate, aluminum silicate, barium oxide and calcium-magnesium-aluminum borosilicate glass. 2,511,679. General Electric Co.

Mix for forming refractory concrete comprising calcium aluminate cement, topaz containing fluorine, and silica flour. 2,511,724. Universal Atlas Cement Co.

Mix for forming refractory concrete comprising calcium silicate cement, topaz containing fluorine and silica flour. 2,511,725. Universal Atlas Cement Co.

*Coatings**

Durable synthetic alkyd resin coating containing as a pigmenting ingredient a mixture comprising an azo dyestuff and as a viscosity stabilizing adjuvant an azo pigment. 2,508,448. E. I. du Pont de Nemours & Co.

Surface coating resin comprising the heat-reaction product of a methylol melamine-alcohol condensation product with an aryl sulfonamide. 2,508,-875. Monsanto Chemical Co.

Alkyd-melamine resin coating compositions. 2,508,876. Monsanto Chemical Co.

Liquid coating composition comprising a dispersion of zinc dust, in an aqueous solution of an alkali metal silicate of the class consisting of potassium silicate and sodium silicate. 2,509,875. Industrial Metal Protectives, Inc.

Vitreous enamel coated article obtained by firing a vitreous enamel on a steel which has been acid pickled and has had a coating of colloidal sulphur deposited on the pickled surface and completely coated and sealed with a coating of a thin plate of a metal from the group consisting of cobalt, nickel and alloys of cobalt with sulphur prior to firing. 2,510,071. Poor & Co.

Cellulose propionate materials coated with a firmly-adherent, blush-resistant coating deposited from a lacquer consisting of cellulose nitrate dissolved in a medium boiling volatile solvent for the cellulose nitrate, a lower aliphatic alcohol diluent having a most 5 carbon atoms which is a latent solvent for the cellulose nitrate and a non-solvent aliphatic petroleum hydrocarbon diluent. 2,510,166. Celanese Corp. of America.

Hot-melt coating composition comprising cellulose propionate in which are incorporated a mixture of plasticizers for the cellulose propionate, up to 25% by weight of said mixture being butoxyethyl stearate and the remainder dibutyl sebacate. 2,510,177. Celanese Corp. of America.

Non-flashing water thinnable casein paste paint consisting of peptized casein, pigments, fillers, water and a sugar derivative selected from a group consisting of gluconic, arabonic, mannonic, gulonic, galactonic and talonic acids. 2,511,782. National Gypsum Co.

*Detergents**

Detergent composition comprising a flake alkali metal hydroxide, a water-soluble compound taken from the class consisting of phosphoric acid, alkali metal ortho-phosphates and alkali metal polyphosphates, and a liquid, water-dispersible amine. 2,509,440. E. F. Drew & Co., Inc.

Preparation of a surface-active organic nitrosation-sulfitation product in the polyvalent metal salt form by reacting a water-soluble salt of a polyvalent metal with an organic nitrosation-sulfitation product in a liquid reaction medium containing water and an alcoholic solvent of low water-solubility. 2,510,466. Allied Chemical & Dye Corp.

Germicidal detergent composition which consists essentially of a water-soluble soap and a glassy phosphate and having a silver content effective to impart germicidal properties when dissolved in water. 2,510,510. Economics Laboratory, Inc.

Neutralizing a capillary active sulphonated organic product by suspending a neutralizing agent in an inert organic solvent for the neutralized capillary active sulphonated organic product, said solvent being used in an amount sufficient to dissolve the said neutralized product. 2,511,043. Georg Ludvig Busch.

*Dyes & Pigments**

Chromiferous monazo dyes. 2,508,404. E. I. du Pont de Nemours & Co.

Insoluble azo maroon pigment. 2,508,447. E. I. du Pont de Nemours & Co.

Leuco sulfate esters of 1;1' di-anthraquinonylamides of dibasic carboxylic acids. 2,508,814. Imperial Chemical Industries, Ltd.

Vat dyes of the anthraquinone 1,3,4-oxdiazole series. 2,511,018. E. I du Pont de Nemours & Co.

Pad dyeing of cellulose derivative fabrics with an alcoholic solution followed by padding with an aqueous thiocyanate solution. 2,511,103. Celanese Corp. of America.

Pigment binder containing an aqueous dispersion containing a resin selected from the group consisting of vinyl chloride polymers, vinylidene chloride polymers and vinyl-vinylidene chloride copolymers, an unvulcanized latex comprising a synthetic rubbery polymer of a butadiene hydrocarbon and containing solids, and a water-soluble protein-alkylolamine-urea-formaldehyde reaction product. 2,511,113. Stein, Hall & Co., Inc.

Methine dyestuffs. 2,511,210. Ilford Ltd.

Pyrrocoline polymethinecyanine dyes. 2,511,222. Eastman Kodak Co.

Coloration of fabrics containing spun yarns of organic derivative of cellulose staple fibers, having a proteinaceous size by padding with a solution of a dyestuff for the organic derivative of cellulose material in an aqueous medium comprising a lower aliphatic alcohol and an inorganic swelling agent and then souring said dyed fabric to remove the size therefrom. 2,511,938. Celanese Corp. of America.

In production of pigment titanium dioxide by oxidation of titanium tetrachloride, the step of commingling with the titanium dioxide oxidation product a minor amount of an oxygen compound of boron, and heating. 2,512,079. E. I. du Pont de Nemours & Co.

*Explosives**

Ignition composition comprising a black powder composition and an added explosive ignition accelerant consisting of a primary detonating compound. 2,511,669. E. I. du Pont de Nemours & Co.

*Inorganic**

In reducing iron oxide, the steps of moving a mass of small lumps downward along a vertical path in contact with a reducing gas, heating a selected single portion of the length. 2,508,515. Metal Hydrides, Inc.

Gypsum plaster composition, comprising plaster of Paris, anhydrous gypsum, terra alba, hydrated lime, and sodium citrate. 2,508,600. National Gypsum Co.

Purification of titanium halides by contacting with titanium hydride, and separating and recovering the resulting purified titanium tetrahalide. 2,508,775. E. I. du Pont de Nemours & Co.

Making silica filaments by forcing an anhydrous silica organosol which is miscible with water through a small orifice into water, thereby precipitating the silica in said sol in the form of filaments, removing, mechanically and allowing said filaments to stand for at least 8 hours until they become hardened. 2,509,026. Monsanto Chemial Co.

Treatment of native barium and strontium sulphates, said sulphates being discolored by iron, to form a white sulphate by agitating said ore in a single phase aqueous medium, in which the ore is capable of settling and which contains a dissociatable water-soluble soap of a fatty acid having at least 12 carbon atoms in solution to combine with the iron compounds associated with the ore. 2,509,585. G. and W. H. Corson, Inc.

In generation of chlorine dioxide by reacting an acidified aqueous solution of a water-soluble metal chlorate with a reducing gas in the presence of an inert diluent gas, the improvement which comprises maintaining the acidified aqueous solution at a pH below 2 and at a chlorate concentration below 10%. 2,510,034. Mathieson Chemical Corp.

Manufacture of a liquid mixture of pure sulphur dioxide and sulphur trioxide by reacting sulphur dioxide with oxygen in presence of an active catalyst. 2,510,684. Joseph Cathala.

Tetrauranium heptadecafluoride. 2,510,850. U. S. A. as represented by the U. S. Atomic Energy Commission.

Producing antimony pentafluoride, for use as a fluorinating agent from antimony fluorochlorides obtained by distilling off organic fluorination products from antimony fluorochloride by-products, by reacting the antimony fluorochloride mixture with elemental chlorine, introducing hydrogen fluoride, and fractionally distilling antimony pentafluoride from the resulting reaction mixture, said reaction and distillation being conducted in aluminum vessels. 2,510,872. U. S. A. as represented by the U. S. Atomic Energy Commission.

Sulfur trioxide stabilization by incorporating a compound of the group consisting of antimony pentafluoride and antimony pentachloride. 2,511,-072. Allied Chemical & Dye Corp.

Preparing sodium potassium pyrophosphate, by mixing a 50% solution of Na_2HPO_4 with an approximately 46% solution of K_2HPO_4, drum drying the resulting mixture and then heating to the pyrophosphate forming temperature to produce a product consisting essentially of $Na_2K_2P_2O_7$. 2,511,249. Monsanto Chemical Co.

Producing ammonium sulfate by contacting unpurified coke oven gas with a feed liquor comprising a mixture of pickle liquor containing ferrous sulfate and free sulfuric acid and a recycled liquor containing ammonium sulfate. 2,511,306. Allied Chemical & Dye Corp.

Removing ammonia from coke oven gas and recovering iron values from pickle liquor comprising passing coke oven gas successively through a pickle liquor and a recycled liquor containing ammonium sulfate. 2,511,-307. Allied Chemical & Dye Corp.

In making sodium chlorate by electrolysis of an aqueous solution containing sodium chloride and a small amount of sodium chromate continuously withdrawing electrolyte from an electrolytic cell, continuously passing into the cell an electrolyte consisting of the mother liquor from said withdrawn electrolyte after cooling to remove the excess sodium chlorate. 2,511,516. Western Electrochemical Co.

Furnace for the production of nitric oxide from air. 2,512,259. Robert D. Pike.

Elimination of sodium sulphate from viscose coagulation baths, comprising passing the bath containing the sodium sulphate through at least one reduced pressure zone for effecting evaporation and cooling thereof, effecting an absorption of the heat of the vapors due to evaporation by sulphuric acid, maintaining a reduced pressure in respect to the sulphuric acid, and regaining the heat absorbed by the sulphuric acid or utilization thereof. 2,512,266. Appareils & Evaporateurs Kestner.

Preparing fluorescent thallium-activated calcium orthophosphate by reacting a mixture of calcium compound and phosphoric component together with sufficient activating thallium compound. 2,512,270. General Electric Co.

Sulfuric acid recovery in preparing ethyl alcohol by absorbing ethylene in sulfuric acid, diluting the acid extract with water, distilling, recovering ethyl alcohol overhead and spent acid containing free carbon. 2,512,-327. Standard Oil Development Co.

Heating titanium tetrachloride to induce oxidation in the vapor phase upon contact with a hot, gaseous oxidizing agent by directly commingling said chloride with hot combustion products resulting from the interaction of a dry oxidizing gas with a carbonaceous substance from the group consisting of solid carbon and carbon monoxide, containing less than 0.2% of hydrogen. 2,512,341. E. I. du Pont de Nemours & Co.

*Leather**

Liquid leather dressing consisting of an aqueous dispersion containing carnauba wax, and an emulsion copolymer of diallyl maleate and a mixture of butyl methacrylate and methyl methacrylate. 2,511,695. ½ to Ellis-Foster Co. and ½ to Montclair Research Corp.

Waterproofing leather by impregnating the leather with a waterproofing substance selected from the class consisting of fats and greases which are hard and brittle at normal temperature and then washing the leather with an aqueous solution of sulfated fatty alcohol. 2,512,389. Charles G. Shaw.

*Metals**

Separating cobalt and nickel compounded as the mixed carbonates by calcining, leaching the nickel from the calcine with a dilute solution of an acid capable of forming soluble nickel salts. 2,508,427. U. S. A. as represented by the Secretary of the Interior.

Making a furnace charge for the carbothermal production of magnesium which comprises mixing together magnesium oxide, petroleum coke, coal-tar pitch, and a hydrocarbon oil, briquetting and heating the briquettes in the absence of air at a temperature of at least 400°C. to carbonize the pitch. 2,508,878. Dow Chemical Co.

Removing sulphur from molten ferrous metal, by contacting with a molten sulphide slag consisting of a sulphide selected from the group consisting of sodium sulphide, potassium sulphide, aluminum sulphide and mixtures thereof; maintaining contact until the sulphur content has lowered and separating said molten ferrous metal. 2,509,189. James Fernando Jordan.

Removing nickel and cobalt impurities from zinc electrolyte solutions, by adding small amounts of zinc dust, copper sulphate, a soluble arsenic compound, and thallium sulphate. 2,509,916. Hudson Bay Mining and Smelting Co., Ltd.

Removing nickel and cobalt impurities from zinc electrolyte solutions by adding zinc dust, copper sulphate, a soluble arsenic compound and lead in the form of a soluble compound. 2,509,917. Hudson Bay Mining and Smelting Co., Ltd.

Removing nickel and cobalt impurities from zinc electrolyte solutions by adding zinc dust, copper sulphate, a soluble arsenic compound and silver in the form of a soluble compound. 2,509,718. Hudson Bay Mining and Smelting Co., Ltd.

Manufacture of sponge iron. 2,509,921. Refining Unincorporated.

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* From Vol. 634, Nos. 4, 5; Vol. 635, Nos. 1, 2, 3.

Plating metals with zirconium by electrodeposition upon zirconium reduced by electrolysis in a non-aqueous solution of an aliphatic alcohol and an electrolytically reducible chloride of zirconium. 2,510,128. Tung-Sol Lamp Works, Inc.

Composition for the heat treatment of steels, copper alloys and nickel alloys, consisting of barium chloride; potassium chloride; sodium chloride and sodium fluoborate. 2,510,650. Heatbath Corp.

Protecting metal surfaces against hydrogen sulfide corrosion comprising, contacting said surfaces with a hard wood tar distillate as a protective material. 2,510,771. Pure Oil Co.

Electrodepositing an alloy of the class consisting of copper, cadmium, zinc composed of tin and an alloying metal and antimony, from an aqueous electrolyte consisting of a soluble tin compound in stannate form and a cyanide soluble compound of said alloying metal, using a soluble tin anode, a separate soluble anode of said alloying metal, and a cathode upon which the alloy is deposited. 2,511,395. City Auto Stamping Co.

Preparing iron oxides for reduction by a gaseous reductant. 2,511,400. H. A. Brassert & Co.

Applying a metallic silver coating to an article of non-conducting material by subjecting the surface to the action of a solution of silver perchlorate in an evaporable organic solvent, permitting the evaporation of the solvent, and applying an alkaline reducing agent to reduce the silver salt to metallic silver. 2,511,472. George J. Kmecik.

In treating a manganese-ammonium sulphate solution for electrolysis to produce a deposit of alpha manganese, the step of oxidizing the sulfide ion which comprises agitating the solution in the presence of air. 2,511,507. Crimora Research & Development Corp.

Purifying aluminum containing magnesium as an impurity by contacting the impure aluminum while in the molten state with oxygen and potassium fluoride. 2,511,775. Allied Chemical & Dye Corp.

Plating zinc on aluminum by immersing aluminum in a zincate solution and zinc afterward electroplated on the immersion coating. 2,511,952. United Chromium, Inc.

Preparing ferrous articles for galvanizing by the action of a pickling bath of dilute sulphuric acid containing an organic inhibitor to remove scale, oxides, and other foreign matter. 2,511,988. Columbia Steel Co.

Coating a conductive surface of an article of metal with metallic molybdenum, comprising forming an aqueous solution, of a compound of molybdenum selected from the group consisting of the alkali molybdates and the perchlorate, the sulphate, and the chloride of molybdenum, placing said article in said solution, depositing a plating consisting of molybdenum sesquioxide by making it the cathode, and then heating in a gaseous reducing atmosphere to reduce the plated compound to metallic molybdenum. 2,512,141. Westinghouse Electric Corp.

Purifying aluminum by electrolysis by passing an electric current through an inorganic salt fusion consisting of aluminum chloride and an alkali metal chloride. 2,512,157. Reynolds Metals Co.

Joining preformed metal articles comprising copper at the surfaces by assembling together with a finely divided powder between said surfaces consisting of titanium hydride and copper, heating in a non-oxidizing atmosphere. 2,512,455. Metal Hydrides, Inc.

*Nuclear**

A chemical method for concentrating an isotope of carbon. 2,511,667. U. S. A. as represented by the U. S. Atomic Energy Commission.

*Organic**

Reaction of lower trialkyl phosphites with sulfoxy halides. 2,508,364. Eastman Kodak Co.

Manufacture of halogen-containing biguanides. 2,508,376. Imperial Chemical Industries, Ltd.

Concentration of vitamin E by treating a tocopherol-containing vegetable fatty oil, in a continuous countercurrent extraction system with a liquefied, normally gaseous paraffinic hydrocarbon solvent. 2,508,387. Chemical Foundation, Inc.

Preparing a trialkyl phosphate by reacting phosphorus pentoxide with an ether in an atmosphere of olefin gaseous at the temperature of the reaction. 2,508,389. Eastman Kodak Co.

Preparing 4,5-dihydroimidazoles by heating an ester formed by the esterification of a monocarboxylic acid and a monohydric alcohol with an excess of ethylene-diamine containing less than approximately 10% of water. 2,508,415. Monsanto Chemical Co.

N-substituted poly-iodo phthalimides. 2,508,418. Eli Lilly and Co.

Quaternary ammonium halides of amino benzhydryl ethers. 2,508,422. Parke, Davis & Co.

5-(p-aminobenzene sulfonamido)-1,3 dimethyl-2,4 dioxo-6-amino-tetra-hydropyrimidine. 2,508,450. Aktiengesellschaft vorm. B. Siegfried.

3-keto-4-acylamido-tetrahydrothiophene. 2,508,457. Merck & Co., Inc.

$\Delta^{4,5}$-3,11-diketo-17,20-dihydroxy-pregnanes. 2,508,471. Merck & Co., Inc.

Production of activated carbon by impregnating low density cellulosic material with concentrated aqueous zinc chloride, continuously agitating while heating until the mix temperature begins to decrease without change in external heat input, compacting the reacted mass into forms, heating at a temperature producing a dry and brittle condition, crushing the dried forms into granular particles, and subsequently calcining. 2,508,474. Union Carbide and Carbon Corp.

Cobalt salicylaldehydeethylenediimine. 2,508,490. Regents of the University of Calif.

Amino cyclohexyl ethers. 2,508,499. G. D. Searle & Co.

Manufacture of acetic acid by heating methyl formate in the presence of a carbonyl of an iron metal and a halogen. 2,508,513. Celanese Corp. of America.

Recovering caffein from a solution obtained by aqueous extraction of coffee by extracting the aqueous extract with a water-immiscible organic caffein solvent. 2,508,545. General Foods Corp.

Di-N-substituted piperazine derivatives. 2,508,652. Colgate-Palmolive-Peet Co.

Di-N-substituted piperazine derivatives. 2,508,653. Colgate-Palmolive-Peet Co.

Hydrocarbon esters of hydrocarbonylthiolsulfinic acids. 2,508,745. Sterling Drug, Inc.

Lactones from etiobilienic acid. 2,508,786. Ayerst, McKenna & Harrison, Ltd.

Producing benzamidocyclohexane by reacting a solution of benzoic acid in toluene with preformed cyclohexyl phosphazo-amino cyclohexane and separating the benzamidocyclohexane. 2,508,860. General Aniline & Film Corp.

Pyridylethyl sulfonic acids. 2,508,904. Reilly Tar & Chemical Corp.

Condensing a crotonic ester to a dicrotonic ester, by subjecting the crotonic ester in the liquid phase to a temperature within the range of 70-200°C. in the presence of a condensation catalyst selected from the group consisting of alkali metals and alkali metals and alkali metal alkoxides. 2,508,910. General Mills, Inc.

Treating a system containing a neutral phthalic acid ester with acid phthalic acid ester of the type which on hydrolysis yields an alcohol volatile with steam, by establishing a pH of at least 8 through addition of an alkaline material, and steam distilling the alkaline system said method being characterized by the selective hydrolysis of said acid ester component of the system. 2,508,911. Shell Development Co.

Functionally aliphatic 1,2,2,3-tetrachloro-N-butyl ether. 2,508,916. U. S. Rubber Co.

1-alkoxy-1-aryloxy-2,2,3-trichloro-N-butanes. 2,508,917. U. S. Rubber Co.

Separation of isoprene and cyclopentadiene from a hydrocarbon mixture. 2,508,922. Shell Development Co.

Aldehydes. 2,508,927. General Mills, Inc.

Producing p-acylsulfanilylguanidine by reacting guanidine with the corresponding p-acylsulfanilylchloride in the presence of aqueous alkali metal hydroxide solution and a ketone. 2,508,929. U. S. Rubber Co.

Removing water from water-wet p-acetylsulfanilylchloride by admixing the same with a ketone. 2, 508,930. U. S. Rubber Co.

4-methly(diallyl aminoalkyl-amino) quinolines. 2,508,937. U. S. A. as represented by the Secretary of War.

Preparing a β-(acenaphthoyl) acrylic acid by halogenating a β-(acenaphthoyl) propionic acid, dehydrohalogenating the resulting β-halo-β-(acenaphthoyl)-propionic acid with a mild base, and isolating the β-(acenaphthoyl) acrylic acid. 2,508,990. G. D. Searle & Co.

Methylation of xanthine to form caffeine. 2,509,084. Technical Specialties Co.

Producing a pinacol by contacting a ketone with an alkali metal-lead alloy under the influence of ions of an alkaline earth metal. 2,509,127. White Labs., Inc.

Perhalomethylcyclohexadienes. 2,509,155. Purdue Research Foundation.

Dichlorooctafluorocyclohexene. 2,509,156. Purdue Research Foundation.

Making hexachlorocyclopentadiene by heating a compound selected from the group consisting of aliphatic hydrocarbons wherein the number of carbon atoms in the hydrocarbon molecule is at least 5, and wherein the longest straight chain contains at least 4 carbon atoms; alicyclic hydrocarbons containing 5 carbon atoms in the rings; and chlorinated derivatives of the foregoing types with chlorine and, separating hexachlorocyclopentadiene. 2,509,160. Purdue Research Foundation.

Preparing primary alcohols by treating a member selected from the group consisting of thiocarboxylic acids having more than 2 carbon atoms and esters thereof with Raney nickel. 2,509,171. Ciba, Ltd.

Preparing auromercapto-aliphatic acids, by dissolving a ω-carboxyalkylisothiourea in an aqueous solution of an alkali metal hydroxide, treating with sulfur dioxide, adding gold halide, acidifying and recovering the auromercapto-aliphatic acid precipitate. 2,509,198. Abbott Labs.

COOH-CH$_2$-CH(CH$_2$SAu)-COONa. 2,509,200. Abbott Labs.

S-carboxyalkylene isothiuronium salts of antimonyl tartrate. 2,509,201. Abbott Labs.

Preparing 2,4,5-trichlorophenol, by heating 1,2,4,5-tetrachloro benzene and an alkali metal hydroxide in the presence of ethylene glycol or propylene glycol. 2,509,245. Givaudan Corp.

Tetrahydrodibenzopyrans. 2,509,386. Roger Adams.

1-hydroxy-3-(alkyl)-*,*,9-trimethyl-7,8,9,10-tetrahydro-6-dibenzopyran. 2-509,387. Roger Adams.

Producing mono-and di-glycerides of fatty acids by providing a composition consisting of glycerides of a plurality of fatty acids having an even number of carbon atoms and which are higher in fatty acid content than those to be produced, adding boric acid thereto, heating, whereby lower fatty acids are freed from combination, removing said lower acids by distillation. 2,509,413. E. F. Drew & Co., Inc.

A glyceride oil having shortening properties, having the general formula-R(OH)n(COOH)n wherein R represents hydrocarbon groups having from 1 to 5 carbon atoms, and n is 1 or 2, the OH groups being substantially fully esterified. 2,509,414. E. F. Drew & Co., Inc.

Making benzothiazole by reacting hydrogen peroxide with the sodium salt of 2 mercaptobenzothiazole in aqueous solution, adding sulfuric acid and separating the liberated benzothiazole. 2,509,453. R. T. Vanderbilt Co., Inc.

Sodium salts of the benzothiazyl sulfinic acids. 2,509,454. R. T. Vanderbilt Co., Inc.

Production of thiolesters by contacting mercaptans with a gaseous ketene in the presence of a mutually miscible, inert solvent. 2,509,483. Phillips Petroleum Co.

Direct separation of acetic acid from a tar-free mixture of vapors and non-condensable gases resulting from the distillation of wood, by extracting with a heavy wood tar oil. 2,509,539. Hermann Suida.

Producing nicotinanilide by reacting a solution of phenylphosphazoanilide in toluene with nicotinic acid. 2,509,594. General Aniline & Film Corp.

Separating a chlorphenoxy acetic acid from an admixture of said acid with a chlorphenol by melting and running into kerosene in a thin stream to selectively dissolve out the chlorphenol. 2,509,772. American Chemical Paint Co.

Preparation of 1,2,4,5-tetracarboxy benzene by contacting a gasiform feed mixture of 1,2,4,5-tetramethyl benzene vapor and air with a vanadium pentoxide catalyst promoted with potassium sulfate. 2,509,855. Standard Oil Development Co.

Nitriles from butadiene and hydrogen cyanide in the presence of a cuprous halide catalyst. 2,509,859. E. I. du Pont de Nemours & Co.

Obtaining metallic salts of sulfonic acids by sulfonating a naphthenic petroleum fraction to obtain a mixture of oil and mahogany sulfonic acids, neutralizing with alkali metal hydroxide solution, extracting the neutralized mixture with alcoholic solvent, adding sodium chloride to salt out the sulfonic salts in an alcoholic layer and to form an aqueous layer, separately removing the alcoholic layer and adding alkaline earth metal salt thereto to combine with the sulfonates and form an alcoholic layer with divalent metal sulfonates therein and removing said alcoholic layer as product. 2,509,863. Standard Oil Development Co.

Dehydrating maleic acid to its anhydride by forming a reaction mixture of maleic acid with toluene and a small catalytic amount of sulfuric acid, heating continuously distilling from the reaction mixture toluene together with water formed by dehydration. 2,509,873. Standard Oil Development Co.

Preparing a 1,3-dioxolane from a polyhydric alcohol having hydroxyl groups on adjacent carbon atoms, by chemically condensing molecules of the alcohol, per se, in a liquid reaction mixture consisting of said alcohol and concentrated sulfuric acid, heating until the alcohol is substantially converted to a 1,3-dioxolane, and thereafter distilling from said mixture the 1,3-dioxolane product. 2,509,874. Standard Oil Development Co.

Preparing acetic anhydride by pyrolyzing a ketone to the corresponding ketene, to contact with acetic acid. 2,509,877. Standard Oil Development Co.

Forming aldehydes by dissolving a cobalt soap in a liquified olefin, adding alcohol to retard gelatin, continuously charging the resulting olefin solution to a reaction zone, simultaneously charging a mixture of hydrogen and carbon monoxide, maintaining a temperature of about 200° to 400°F. while maintaining a pressure of 100 to 300 atmospheres. 2,509,878. Standard Oil Development Co.

Separating the resin acids from tall oil by selectively esterifying tall oil to form a mixture comprising fatty acid esters and resin acids, dissolving

* From Vol. 634, Nos. 4, 5; Vol. 635, Nos. 1, 2, 3.

said mixture in a liquid petroleum hydrocarbon solvent, and precipitating the resin acids from the resulting solution with cyclohexylamine. 2,509,884, Hercules Powder Co.

In preparation of isobutylene by absorption of a mixture of C_4 hydrocarbons in an acid to form an isobutylene-acid extract, the improvement which comprises contacting the acid extract with a saturated aliphatic hydrocarbon of 4 to 8 carbon atoms per molecule and separating a liquid hydrocarbon phase prior to the isobutylene regeneration step. 2,509,885. Standard Oil Development Co.

Stabilizing xylidene against discoloration during storage, by adding monocyclohexylamine. 2,509,891. Standard Oil Development Co.

Preparing fused cyclic derivatives of thiophene by reacting a cyclic compound having a generic formula R_1-R_2, wherein R_1 and R_2 represent cyclic nuclei containing a hydrogen-substituted carbon atom adjacent to the intercyclic bond with hydrogen sulfide in the presence of a solid particulate contact catalyst. 2,509,938. Texas Co.

Alkali metal salt of a sulfosuccinic acid di-ester of an ether-alcohol selected from the group consisting of propylene glycol phenyl ether, propylene glycol 4-chloro-phenyl ether, propylene glycol 2,4-dichlorophenyl ether and propylene glycol 2,4,6-trichlorophenyl ether. 2,510,008. Dow Chemical Co.

Separating normally liquid unsaturated higher fatty acids and normally solid saturated fatty acids by contacting prechilled solidified particles of said mixture of fatty acids with a solvent therefor and separating undissolved fatty acids. 2,510,015. Wilson & Co., Inc.

Alkyl or allyl trichlorophenyl carbonates. 2,510,025. Dow Chemical Co.

Reacting a mixture consisting of P_2O_5, $POCl_3$ and a monohydric alcohol. 2,510,033. Monsanto Chemical Co.

2-hydroxy-4:4'-diamidino-stilbene. 2,510,047. May & Baker, Ltd.

Biguanide derivatives. 2,510,081. Imperial Chemical Industries, Ltd.

1,4-diaminoanthraquinone compounds containing a cyano group in the 2-position. 2,510,088. Eastman Kodak Co.

Segregating organic solvent-soluble allyl starch from the reaction products formed on interaction of starch with an allyl halide in the presence of concentrated aqueous alkali hydroxide, by combining said mixture with a low-boiling, water-soluble, allyl starch solvent; neutralizing the resulting solution; adding a low-boiling, water-immiscible allyl starch solvent to cause complete separation of the water present in said solution; separating the resulting organic solvent phase from the aqueous phase and solid insoluble material, and spray drying the organic solvent solution to recover the allyl starch. 2,510,089. U. S. A. as represented by the Secretary of Agriculture.

In manufacturing lower aliphatic acids by reacting an olefin, carbon monoxide and water in the presence of an aqueous cobalt-containing catalyst liquid the process being one in that said catalyst liquid is prepared by incorporating a cobalt salt of a lower aliphatic acid in an aqueous solvent, activating the resultant solution with carbon monoxide, separating any solids therefrom and employing the resultant solid-free liquid as the catalyst liquid. 2,510,105. Eastman Kodak Co.

Producing mono-isopropyl quinoline by reacting quinoline hydrochloride in aqueous solution with propylene in the presence of an alumina-silica catalyst. 2,510,134. Koppers Co., Inc.

Preparing chloromethylpentamethyldisiloxane by charging hexamethyldisiloxane into a reaction zone, continually charging chlorine into said reaction zone whereby the hexamethyldisiloxane is chlorinated and continually removing chlorinated hexamethyldisiloxane. 2,510,148. Corning Glass Works.

Preparing monochlormethyl silicon chlorides by charging methyl silicon chloride into a reaction zone, maintaining the rate of charging chlorine relative to methyl silicon chloride sufficiently low that methyl silicon chloride is maintained in the reaction zone continuously, whereby the methyl silicon chloride is chlorinated, whereby the monochloro derivative condenses upon formation, and continually removing chlorinated methyl silicon. 2,510,149. Corning Glass Works.

Chlorinating dibenzyl and nuclearly-alkyl-substituted dibenzyls by preparing a carbon tetrachloride solution containing a ferric chloride catalyst and chlorinating by means of chlorine. 2,510,279. Andre Gislon and Joseph Quiquerez.

Preparation of aliphatic β-amino sulfonic acids, by reacting salts of aliphatic β-nitro sulfonic acids with hydrogen. 2,510,281. Visking Corp.

Preparing β-nitro sulfonic compounds by reacting a nitro olefin with an aqueous solution of a compound selected from the group which consists of water soluble sulfites and bisulfites in which the cation is selected from the group consisting of metals, ammonium, and N-substituted ammonium ions. 2,510,282. Visking Corp.

Producing an ethylene oxide condensate of an ethanol rosin amine. 2,510,-284. Hercules Powder Co.

Producing an ethanol rosin amine by reacting ethylene oxide with a rosin amine in solution with a volatile aliphatic alcohol and in the absence of an alkaline catalyst. 2,510,295. Hercules Powder Co.

Removing emulsion polymerization inhibitors from a dehydrogenated rosin by dissolving the entire dehydrogenated rosin product in a volatile hydrocarbon solvent, and contacting with an adsorbent earth. 2,510,297. Hercules Powder Co.

An oxyalkylated, drastically-oxidized oiticica oil-castor oil condensate, obtained by a reaction in the presence of an acid sulfate activating agent; by oxidation with a gaseous oxygen-containing medium to endow the final product with distinctly hydrophile properties, with oxyalkylating agent selected from the class consisting of ethylene oxide, propylene oxide, butylene oxide, glycide, and methyl glycide. 2,510,335. Petrolite Corp., Ltd.

Reaction of beta-lactones with organic magnesium halides to form a complex addition product, treating with an aqueous solution of a mineral acid, whereupon the addition product is decomposed and an alpha-beta unsaturated ketone is formed. 2,510,364. B. F. Goodrich Co.

Treating oil containing break constituents which comprises treating the oil with an alkali, then further treating with a strong acid and subsequently removing the resultant salt. 2,510,379. Pittsburgh Plate Glass Co.

Producing alkyl esters of alpha-beta unsaturated monocarboxylic acids from a beta-lactone and an alcohol. 2,510,423. B. F. Goodrich Co.

Cyclohexenes disubstituted in the 4-position by cyano or carbamyl groups. 2,510,491. B. F. Goodrich Co.

Making a magnesium alcoholate by reacting an alcohol with compounds selected from the group consisting of magnesium carbide, corresponding to the formula Mg_2C_3, and magnesium nitride, under anhydrous conditions and in the presence of an organic halide catalyst. 2,510,550. Kaiser Aluminum & Chemical Corp.

Production of nicotinonitrile by contacting a gas-vapor reaction mixture containing molecular oxygen, ammonia and beta-picoline with an oxidation catalyst containing oxides of vanadium, molybdenum and phosphorus. 2,510,605. Allied Chemical & Dye Corp.

Preparing an organohalogenosilane in which all the halogens in the said silane are attached directly to a silicon atom by reaction in the liquid phase between (1) a compound corresponding to the general formula $HC{\equiv}CR$ where R is a member of the class consisting of hydrogen and monovalent hydrocarbon radicals free of olefinic unsaturation and (2) a silicon hydride containing a hydrogen and a halogen attached directly to the silicon atom, the remaining valences of the silicon being satisfied by a member of the group consisting of hydrogen, monovalent hydrocarbon radicals, and halogens, the said reaction being effected in the presence of a peroxy vinyl polymerization catalyst for the reaction. 2,510,642. General Electric Co.

2-chloro-2-(3-cyclohexenyl) ethyl dichlorophosphine. 2,510,699. United States Rubber Co.

Making methyldihydrothebainone by adding a benzene solution of dihydrocodeinone to a benzene solution of a methyl magnesium halide, decomposing the complex formed by adding excess dilute hydrochloric acid, extracting the methyldihydrothebainone with chloroform, purifying by forming a hydrohalide of the methyldihydrothebainone. 2,510,731. Mallinckrodt Chemical Works.

Making 6-methyldihydrocodeine by adding a benzene solution of dihydrocodeinone to a benzene solution of methyl magnesium chloride and decomposing the complex formed. 2,510,732. Mallinckrodt Chemical Works.

Oil soluble tri-(substituted-mercapto)-antimonous acids. 2,510,738. Abbott Labs.

A ω-cyclic-alkyl isothiuronium halide. 2,510,739. Abbott Labs.

Tri-(cyclic-lower alkylene mercapto)-S-antimonous acids. 2,510,740. Abbott Labs.

In purifying tall oil abietic acid crystals to remove adhering mother liquor containing liquid phase fatty and rosin acids, the step which consists in bringing into intimate contact abietic acid and a dilute water solution of an alkali metal substance which does not form insoluble soaps and which furnishes hydroxyl ions to neutralize free fatty acids present in said liquid phase. 2,510,755. West Virginia Pulp and Paper Co.

Diguanamines. 2,510,761. Libbey-Owens-Ford Glass Co.

Production of selenomercaptans. 2,510,765. California Research Corp.

Preparing a tertiary amino-alkyl thiol-ester hydrochloride by reacting diphenylacetyl chloride and an aliphatic tertiary aminoalkanethiol in an inert organic solvent. 2,510,773. Sterling Drug, Inc.

Bis(tertiaryaminoalkyl) arylacetonitriles and the corresponding acids and esters. 2,510,784. Sterling Drug, Inc.

Esters of 10,11-di(alkylcarbonyloxy) hendecanoic acid. 2,510,802. Hercules Powder Co.

Catalyst for oxidation of naphthalene to phthalic anhydride comprising the product produced by coating particles of an inert, refractory material with vanadium pentoxide by contacting said particles with an aqueous colloidal solution of vanadium pentoxide, evaporating the water, and repeating the steps of solution contact and evaporation until the particles have an adherent coating of about 0.1 to 50% by weight of vanadium pentoxide. 2,510,803. Pittsburgh Coke & Chemical Co.

Purification of crude aliphatic alcohols by extraction with water and a low-boiling substantially water-insoluble organic solvent. 2,510,806. Standard Oil Development Co.

Improvement in recovery of diolefinic hydrocarbons of 4 to 6 carbon atoms by fractional distillation of hydrocarbon mixtures which comprises fractionally distilling such hydrocarbon mixtures in the presence of a polymerization inhibitor consisting of a mixture of an amine of a bi-nuclear aromatic hydrocarbon and a hydroxy bi-nuclear aromatic hydrocarbon. 2,510,847. Standard Oil Development Co.

Stabilizing aromatic amines by adding thereto the reaction product of P_2S_5 with a polyalkyl phenol. 2,510,849. Standard Oil Development Co.

In purification of phthalic anhydride obtained by catalytic oxidation of naphthalene vapors, and containing naphthoquinone type impurities, the steps which comprise adding maleic anhydride, heating, thereafter adding sodium bisulfite, and continuing the heating and recovering the purified phthalic anhydride by volatilization. 2,510,852. Allied Chemical & Dye Corp.

Methyl octadecyl dichlorosilane. 2,5..0, 853. Dow Chemical Co.

Production of a catalyst for the fluorination of organic compounds by plating a heat conducting metal substantially resistant to attack by fluorine with a metal which reacts readily with fluorine selected from the group consisting of silver, cobalt, manganese and cerium and reacting the latter with a fluorinating agent. 2,510,864. U. S. A. as represented by the U. S. Atomic Energy Commission.

Preparing 1,4-diguanylpiperazine by mixing an aqueous solution of cyanamide and an acid salt of piperazine and heating in a solvent consisting of water. 2,510,869. American Cyanamid Co.

In separating pure quinaldine from a mixture of quinaldine with like-boiling nitrogen bases, treating the mixture in an anhydrous medium and in the absence of alcohols, with hydrogen chloride to precipitate substantially pure quinaldine hydrochloride, and separating this precipitate. 2,510,875. Allied Chemical & Dye Corp.

In separating an enriched 2,4-lutidine product from a mixture of 2,4-lutidine with like-boiling nitrogen bases including 2,3-lutidine, treating the mixture in an anhydrous medium with hydrogen chloride to precipitate 2,4-lutidine hydrochloride preferentially and separating this precipitate. 2,510,876. Allied Chemical & Dye Corp.

Separating isoquinoline from a mixture of nitrogen bases of coal tar origin by reacting said mixture in a substantially anhydrous medium with an amount of hydrogen chloride sufficient to react with about 85% of the isoquinoline, whereby substantially pure isoquinoline is precipitated in the form of its hydrochloride, and separating the precipitated hydrochloride. 2,510,877. Allied Chemical & Dye Corp.

Amide-epoxy-phenol compositions. 2,510,886. Devoe & Raynolds Co., Inc.

Synthesizing organic disulfides by subjecting reactants selected from the group consisting of (a) a mixture of organic disulfides, (b) a mixture of an organic disulfide and a mercaptan, and (c) an unsymmetrical organic disulfide to a redistribution of their organo-thiyl groups by reacting said reactants in the presence of a catalyst chosen from the group consisting of an alkali-metal mercaptide. 2,510,893. Velsicol Corp.

Synthesizing organic disulfides by subjecting reactants containing different organo-thiyl groups selected from the group consisting of (a) a mixture of organic disulfides, (b) a mixture of an organic disulfide and a mercaptan, and (c) an unsymmetrical organic disulfide to a redistribution of their organo-thiyl groups by reacting said reactants in the presence of a catalyst chosen from the group consisting of, chlorine, bromine, iodine, hydrogen chloride, hydrogen bromide, and hydrogen iodide. 2,510,894. Velsicol Corp.

Abietyl borates containing in chemical combination an abietyl alcohol and a boric acid. 2,510,904. Hercules Powder Co.

Hydroxylation of an ethylenically unsaturated organic compound selected from the group consisting of ethylenically unsaturated fatty acids, ethylenically unsaturated fatty alcohols, esters of said fatty acids and esters of said fatty alcohols by reacting said unsaturated organic compound and an inorganic persulfate in the presence of a saturated monocarboxylic acid and hydrolyzing the product to convert any ester groups resulting from the reaction to hydroxyl groups. 2,510,905. Hercules Powder Co.

Process for the normal addition of hydrogen sulfide to an olefin by reacting an olefin and H_2S in the presence of an aluminum chloride catalyst. 2,510,921. California Research Corp.

In preparing nicotinamide, the improved process which comprises the steps of suspending a zinc salt of nicotinic acid in a concentrated aqueous solution of a strong mineral acid, adding an alkanol of about 1 to 6 carbon atoms, refluxing until a major portion of the salt is converted to an alkyl nicotinate, removing the unreacted alkanol, raising the pH to al-

* From Vol. 634, Nos. 4, 5; Vol. 635, Nos. 1, 2, 3.

kalinity, separating the alkyl nicotinate, combining the separated nicotinate with aqueous ammonia and with anhydrous ammonia and separating the amide from the reaction mixture. 2,510,922. American Cyanamid Co.

Reacting 2-amino-5-carbamylthiazole with p-nitrobenzenesulfonyl chloride and reducing the nitro group on the reaction product to an amino group to produce 2-sulfanilamido-5-carbamylthiazole. 2,510,925. Allied Labs., Inc.

Alkylating salicyclic acid with cetene, which comprises introducing cetene into a mixture of salicyclic acid and antimony trichloride. 2,510,937. Shell Development Co.

Δ^4,5-3,11-diketo-20,21-dioxy-pregnenes. 2,510,940. Merck & Co., Inc.

N-cyclohexyl nicotinamide. 2,510,945. U. S. A. as represented by the Secretary of Agriculture.

Cyanomelamines. 2,510,981. American Cyanamid Co.

Organo antimonous derivative having the formula $Sb_Yx(OCH_2CHR.Y)_{3-x}$ where R is selected from the group consisting of hydrogen, alkyl, haloalkyl, hydroxyalkyl, alkenyl and phenyl, Y is halogen and x is an integer from 0 to 2. 2,511,013. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

A bis-(1-aminoanthraquinoneoxdiazole which dissolves in sulfuric acid with a weak yellow color and dyes cotton from a violet alkaline hydrosulfite vat in bluish-red shades of good fastness. 2,511,019. E. I. du Pont de Nemours & Co.

4-[(para-aminophenyl)alkyl]cyclohexylamine. 2,511,028. E. I. du Pont de Nemours & Co.

Organo siloxanes, $R_aSi[CH_2SiR_2]mO[CH_2SiR_2]mSiR_a$, in which each R is a radical of the group consisting of monocyclicaryl and alkyl radicals and each m has a value of from 1 to 8. 2,511,056. Dow Corning Corp.

In preparing an N-ricinoleyl amine, the step which comprises heating a ricinoleic acid containing inter- and intraesters of ricinoleic acid with water and an amine having a replaceable hydrogen atom attached to a nitrogen atom of an amino group. 2,511,163. National Aluminate Corp.

Hydrolysis of p-chlorobenzenesulfonic acid to chlorobenzene and recovering said chlorobenzene which comprises continuously boiling an organic mixture comprising p-chlorobenzenesulfonic acid, sulfuric acid and water. 2,511,166. U. S. Rubber Co.

Effecting the conversion of an alkali metal salt of p-chlorobenzenesulfonic acid to chlorobenzene which comprises continuously boiling an organic mixture comprising an alkali metal salt of p-chlorobenzenesulfonic acid, sulfuric acid and water. 2,511,167. U. S. Rubber Co.

Production of 2,5-ditertiary butyl hydroquinone by heating hydroquinone with tertiary butyl alcohol, in the presence of anhydrous zinc chloride. 2,511,193. Eastman Kodak Co.

Preparing concentrated formic acid comprising subjecting dilute formic acid to distillation, in the presence of a tertiary amine. 2,511,198. Allied Chemical & Dye Corp.

Separating acetylene and propylene from a mixture of gases containing acetylene, ethylene, and propylene by removing the acetylene and propylene together in polyethylene glycol ether. 2,511,206. Tennessee Eastman Corp.

Separating nicotinic acid from a mixture of nicotinamide with nicotinic acid, by dissolving said mixture in an aliphatic ketone, adding both water and sufficient calcium hydroxide to cause conversion of said nicotinic acid to calcium nicotinate, driving off the added water, filtering the precipitate of calcium nicotinate, adding water and finely divided silica for absorbing retained basic material, driving off the added water, and filtering. 2,511,244. R. P. Scherer Corp.

Improving the absorptive ability of activated carbon for poisonous gases by impregnating said activated carbon with an aqueous solution of copper ammonium carbonate fortified with a silver solution of silver nitrate soluble and drying and calcining the impregnated material. 2,511,288. U. S. A. as represented by the Secretary of War.

Catalytic product having high activity for removing poisonous gases from air contaminated thereby, consisting of activated carbon impregnated with minor proportions of metal compounds which impart to the activated carbon a long arsine life, said compounds being substantially dry copper oxide, copper thiocyanate, silver thiocyanate and a water soluble sodium compound. 2,511,289. U. S. A. as represented by the Secretary of War.

Sulfa derivatives of 2-amino-5-alkenyl-1,3,4-thiadiazoles. 2,511,371. Monsanto Chemical Co.

d-α-benzylpenicilloic acid. 2,511,390. Merck & Co., Inc.

Production of enol acetates by mixing and condensing ketene with a ketonic compound in the presence of a heterogeneous solid sulfonation and partial oxidation product of a solid carbonaceous material. 2,511,423. Union Carbide and Carbon Corp.

Stabilization of fatty materials by admixing a relatively small quantity of a phosphatide with a fatty material, heating with ammonia, and subsequently removing from the mixture the free ammonia, the ammonia combined with fatty acids and any water which is present. 2,511,427. Nopco Chemical Co.

Enhancing the antioxidant activity of a phosphatide by heating in contact with ammonia. 2,511,428. Nopco Chemical Co.

Nitrating kerosene by mixing nitric acid and kerosene. 2,511,433. Fred Fials, Sr.

Selectively hydrogenating acetylene present in small amounts in a gas comprising a lower olefin, acetylene and hydrogen by passing said gas over a catalyst prepared by treating nickel oxide with a hydrogen-containing reducing gas and thereafter treating the reduced composition with a sulfiding agent. 2,511,453. E. I. du Pont de Nemours & Co.

Obtainment of a secondary mononitroparaffin by reacting a normal paraffin with a nitrating agent at a temperature between about 150° C. and about 250° C. at an elevated pressure of about 150 psi. 2,511,454. Socony-Vacuum Oil Co., Inc.

In converting a volatile aliphatic alcohol ester of a organic acid to its corresponding acid and alcohol, the step of passing the ester and water in the vapor phase over a zinc salt of an organic acid corresponding to the organic acid being hydrolyzed. 2,511,467. E. I. du Pont de Nemours & Co.

Catalytic oxidation of ketones which comprises subjecting to oxidation in the liquid phase, a ketone corresponding to the general formula $RCOR_1$, in which R denotes an alkyl, cycloalkyl, aralkyl or aryl radical and R_1 an alkyl cycloalkyl or aralkyl radical, in the presence of a solvent for the ketone by means of a gas containing oxygen, in the presence of a mixture of manganese and barium organic acid salts, and a cobalt organic acid salt. 2,511,475. E. I. du Pont de Nemours & Co.

Isopropylation of a di-(alkoxymethoxyalkyl) amine by subjecting a di-(alkoxymethoxyalkyl) amine to a reaction in the presence of acetone and hydrogen in the presence of a hydrogenation catalyst. 2,511,476. E. I. du Pont de Nemours & Co.

Synthesis of iminodiacetonitrile by heating aminoacetonitrile with formaldehyde cyanhydrin in the presence of a mineral acid stabilizer. 2,511,487. E. I. du Pont de Nemours & Co.

Production of 4-chloro-3-nitro-benzene sulfonyl chloride, by reacting ortho-chloro-nitrobenzene with chlorsulfonic acid. 2,511,547. Celanese Corp. of America.

Preparing a stable dry, substantially completely saponified rosin comprising reacting rosin with aqueous sodium carbonate. 2,511,575. Hercules Powder Co.

Esters of anthracene acid adducts. 2,511,578. Neville Co.

Preparing the nitrile of a disproportionated rosin by reacting rosin in liquid phase with gaseous ammonia in the presence of a noble metal hydrogenation catalyst. 2,511,603. Hercules Powder Co.

Separating the resin acids from tall oil by selectively esterifying tall oil to form a mixture comprising fatty acid esters and resin acids, dissolving

In preparation of alpha methoxy propionitrile the improvement which consists of reacting a slurry of paraformaldehyde and propionitrile in the presence of alumina. 2,511,653. Sinclair Refining Co.

Separating a mixture of isomeric xylenes by sulfonation. 2,511,711. California Research Corp.

Converting ethylene in gaseous mixtures with at least one higher aliphatic olefin to ethyl alcohol and concomitantly causing said higher olefin to alkylate an alkylatable isoparaffin hydrocarbon. 2,511,758. Phillips Petroleum Co.

Producing acetaldehyde by introducing acetylene and an aqueous catalyst solution into a reaction zone, and continuously removing aqueous catalyst solution and acetaldehyde, recovering the acetaldehyde, regenerating and recycling the catalyst to the reaction zone. 2,511,787. Merle Randall.

Converting ethylene in a mixture with at least one higher aliphatic olefin to ethyl alcohol and causing said higher olefin to alkylate an alkylatable isoparaffin hydrocarbon. 2,511,810. Phillips Petroleum Co.

Compounds of the general formula $R[SiR_2CH_2]_nSiR_3$ in which R represents alkyl and n is a positive integer. 2,511,812. Dow Corning Corp.

Substituted cyclohexene-1 which contains as the only substituents a methyl radical in the 1-position, a monovalent unsaturated two-carbon hydrocarbon radical in the 2-position and a lower alkoxy radical in the 4-position. 2,511,815. Hoffman-La Roche, Inc.

Chlorination of paraffinic hydrocarbons of 10 to 16 carbon atoms to yield a light colored product which comprises: passing gaseous chlorine into the hydrocarbon, under actinic light. 2,511,818. Hooker Electrochemical Co.

Reacting an aromatic halohydrocarbon which contains at least one halogen atom bonded to a carbon atom in an aromatic ring with a halomonohydrosilane of the general formula $RnHSiCl_{3-n}$, in which R represents a monovalent hydrocarbon radical and n has a value of from 0 to 1 inclusive to produce an organohalosilane in which a silicon atom is bonded to a carbon atom in the aromatic ring. 2,511,820. Dow Chemical Co.

Separating methyl ethyl ketone from a mixture with secondary butyl alcohol by extractive distillation with water. 2,511,847. Standard Oil Development Co.

Purifying crude phthalic anhydride by heating crude anhydride and an inorganic acid reacting oxidizing agent selected from the group consisting of sulfuric acid, nitric acid, sulfur trioxide, mixtures of sulfuric and nitric acid, and hydrogen peroxide; adding alkali metal nitrate; heating to permit separation of phthalic anhydride from the impurities therein by distillation. 2,511,861. Monsanto Chemical Co.

Reacting a mixture of isoprene, an organic acid, and a lower alkyl hypohalite to provide esters of isoprene halohydrins. 2,511,870. Ortho Pharmaceutical Corp.

Heterocyclic compounds and their preparation. 2,511,890. Shell Development Co.

Heterocyclic compounds and their preparation. 2,511,891. Shell Development Co.

Production of an aliphatic chloronitro hydrocarbon compound, having a chlorine atom and a nitro group respectively positioned on adjacent carbon atoms, by adding nitryl chloride to an aliphatic olefin. 2,511,915. Phillips Petroleum Co.

Producing cycloalkadiene from petroleum oils. 2,511,936. Standard Oil Development Co.

Vinylethylene carbonate. 2,511,942. E. I. du Pont de Nemours & Co.

Tetralin oxidation and recovery of hydroperoxide from the oxidation product. 2,511,957. Phillips Petroleum Co.

Beta-nitroalkyl sulfides by reacting a nitroolefin with a sulfhydryl compound. 2,511,961. Carl T. Bahner.

Preparing dicyandiamide acid sulfate by reacting dicyandiamide with sulfuric acid in a non-aqueous solvent. 2,512,037. American Cyanamid Co.

Titanated organo-silicon-oxy compounds. 2,512,058. E. I. du Pont de Nemours & Co.

Condensation product of sulfathiazole and formaldehyde. 2,512,102. Ciba Pharmaceutical Products, Inc.

1-(p-chlorophenyl)-2-pyridylacetylenes and 1-(p-chlorophenyl)-2-quinolylacetylenes. 2,512,180. American Cyanamid Co.

Refining a crude glyceride oil by mist-mixing the oil with a water-adsorptive agent selected from the group consisting of "sodium silicate," colloidal silica, and mixtures thereof, and with a caustic alkali solution to neutralize the free fatty acids to form soapstock. 2,512,245. Ralph H. Fash.

Producing a derivative of 2-aminopyridine capable of reacting with a dialkylaminoalkyl chloride in an inert organic solvent to yield a 2-(dialkylaminoalkylamino) pyridine, which comprises forming an anhydrous mixture of 2-aminopyridine, an alkali metal alcoholate, and an inert organic solvent, heating, reacting said alcoholate with said pyridine, and distilling off the alcohol. 2,512,249. American Cyanamid Co.

1-aryl-5-pyrazolone azo compound. 2,512,251. American Cyanamid Co.

Purifying crude phthalic anhydride by admixing with alkali metal nitrate. 2,512,283. Monsanto Chemical Co.

Substituted ethylenediamines. 2,512,293. Sumner Chemical Co., Inc.

Esters of di-substituted acetic acids and sulfur containing tertiary amino alkanols. 2,512,307. Sterling Drug, Inc.

α-chlorovinylsilanes. 2,512,390. Dow Corning Corp.

Electrolytic oxidation of quinoline to quinolinic acid. 2,512,483. Merck & Co., Inc.

Stabilization of xylidene by mixing with a compound from the group consisting of ferric, vanadic, cobaltic, nickelic and chromic halides, then with an alkali, and thereafter the xylidine is separated from this mixture by distillation. 2,512,504. Standard Oil Development Co.

Dl-4-methyl-5-imidazolidone (2) caproic acid amide. 2,512,512. Merck & Co., Inc.

Halogenated acenaphthoyl alkanoic acids. 2,512,518. G. D. Searle & Co.

Hydroxyalkylaminoalkyl phenothiazine derivatives. 2,512,520. G. D. Searle & Co.

Recovery of 7-substituted-4-hydroxyquinolines. 2,512,551. U. S. A. as represented by the Secretary of War.

Substituted pteridines. 2,512,572. American Cyanamid Co.

Making mixed alkyl benzyl phosphates by heating and reacting an alkali metal salt of an acid alkyl orthophosphate with benzyl chloride in the presence of an organic liquid medium, including water. 2,512,582. Food Machinery and Chemical Corp.

Separating diisopropylamine from a mixture containing diisopropylamine and isopropyl alcohol by adding water and a hydrocarbon which forms heterogeneous azeotrope with water and isopropyl alcohol. 2,512,584. Commercial Solvents Corp.

Azeotropic distillation of isopropyl alcohol from diisopropylamine. 2,512,585. Commercial Solvents Corp.

Paper & Pulp

In making a water-repellent paper from paper stock, the improvement for increasing the dispersibility of a normally non-dispersible finely divided paper filler which comprises adding to the water slurry of the paper stock

[*] From Vol. 634, Nos. 4, 5; Vol. 635, Nos. 1, 2, 3.

prior to heating the slurry and forming a paper, a paste consisting essentially of (a) a finely divided inorganic paper filler the particles of which are coated with a thin water-repellent film of an organopolysiloxane. 2,510,661. General Electric Co.

*Petroleum**

Bitumen-treating agent comprising polyalkylene polyamine and an organo-substituted inorganic acid. 2,508,428. California Research Corp.

Bituminous composition having superior anti-stripping properties consisting of a bitumen and, the salt of a phenol and a polyalkylene polyamine. 2,508,429. California Research Corp.

Bituminous composition having superior anti-stripping properties consisting of a bitumen and an organo-substituted inorganic acid and a water soluble, substantially surface inactive monoamine characterized by an acyclic carbon-to-nitrogen bond. 2,508,430. California Research Corp.

Bituminous composition having superior anti-stripping properties consisting of a bitumen and an organo-substituted acid of phosphorus having at least two carbon atoms and a monoamine characterized by an acyclic carbon-to-nitrogen bond. 2,508,431. California Research Corp.

Bituminous composition having superior anti-stripping properties consisting of a bitumen and a polyamine and an organo-substituted acid of phosphorus. 2,508,432. California Research Corp.

Colored lubricating oil containing a small proportion to impart a greenish fluorescence to the oil stock of a product obtained by reacting phenylhydrazine with a reagent selected from the group consisting of dianisalacetone, anisalcinnimalacetone, and dicinnimalacetone, in acetic acid solution. 2,508,617. Cities Service Oil Co.

Separation of hydrocarbons with diethylene glycolbis-chloroformate. 2,508,723. Phillips Petroleum Co.

High-pressure low-temperature catalytic conversion of carbon monoxide with metal carbonyl. 2,508,743. Texas Co.

In sweetening light petroleum hydrocarbon oils containing mercaptans, the step of dissolving a small amount of an oil-soluble NN' dialkyl paraphenylene diamine in a light hydrocarbon oil containing mercaptans in the presence of oxygen dissolved in said oil. 2,508,817. Tide Water Associated Oil Co.

Improved bonding bituminous composition consisting of a bituminous substance and the salt of an acylamido amine having at least one free amino group and an organo-substituted inorganic acid. 2,508,924. California Research Corp.

Producing gasoline by alkylation and reforming. 2,509,028. Socony-Vacuum Oil Co., Inc.

Separating ethane and ethylene in a predominantly C_2 to C_4 hydrocarbon fraction by distillation. 2,509,044. Standard Oil Development Co.

Reduced catalyst for the catalytic conversion of CO and H_2 which consists of a composite which is MgO, Fe_2O_3, CuO, K_2O and CoO. 2,509,204. Standard Oil Development Co.

Preparing a quick-breaking, free-flowing, oil-in-water type bituminous emulsion stable in storage against the incorporation of 0.5% by weight of ammonium and alkali metal dichromates, comprising emulsifying a bituminous material in water to produce a quick-breaking bitumen-in-water emulsion and incorporating in the emulsion a small amount of a salt selected from the group consisting of ammonium dichromate and alkali metal dichromates. 2,509,574. Stancal Asphalt & Bitumuls Co.

Emulsion fluid for drilling wells comprising water and mineral oil emulsified therein, a finely divided solid weighting material and emulsifying agent capable of stabilizing the emulsion against brine contamination, said emulsifying agent comprising the reaction product of a basic reacting agent capable of forming a water-soluble soap with lauric acid. 2,509,588. Shell Development Co.

Fluidized catalyst process for conversion of hydrocarbons. 2,509,745. Sinclair Refining Co.

Fluid catalyst process for conversion of hydrocarbons with stripping and regeneration of fouled catalyst. 2,509,751. Sinclair Refining Co.

Hydrocarbon synthesis from CO and H_2 with a dense turbulent fluidized mass of a catalyst which consists of a reduced composite of chromia, iron oxide and potassium carbonate. 2,509,869. Standard Oil Development Co.

Inhibiting the evolution in storage of hydrogen sulfide from lubricants compounded with sulfurized oils by adding after removal of free hydrogen sulfide, an oil-soluble soap of a metal selected from the group consisting of lead, cadmium, copper, zinc, chromium, manganese, iron, nickel, and cobalt. 2,510,031. Socony-Vacuum Oil Co., Inc.

Inhibitor for gasoline which comprises adding an alkoxy alkyl phenol. 23,239. Universal Oil Products Co.

Synthesis of hydrocarbons and oxygenated hydrocarbons by the catalytic reduction of a carbon oxide with hydrogen with an iron synthesis catalyst. 2,510,096. Hydrocarbon Research, Inc.

Aqueous mud for use in drilling wells, having dissolved therein a salt of carboxymethyl methyl cellulose which is soluble in aqueous media, said mud being characterized by its ability to form a thin filter cake having low water-loss values, and by its tolerance for brines containing polyvalent cations without loss of its cake-forming and water-retention properties. 2,510,153. Dow Chemical Co.

Catalyst for conversion of hydrocarbons which comprises an alumina carrier impregnated with a catalytic agent consisting of the combined oxides of cobalt and molybdenum. 2,510,189. Union Oil Co. of Calif.

Reforming gasoline. 2,510,673. Pure Oil Co.

Synthesizing hydrocarbons and oxygenated hydrocarbons in a reaction zone containing a body of finely divided iron catalyst, in a fluidized state from hydrogen and carbon monoxide. 2,510,823. Standard Oil Development Co.

Hydrocarbon conversion with the use of a precipitated and calcined beryllium oxide catalyst. 2,510,994. Houdry Process Corp.

Stabilized extreme pressure lubricant consisting of a lubricating oil, an extreme pressure agent consisting of a halogenated hydrocarbon and normally to impart corrosive properties, and a small amount, sufficient to inhibit said corrosive properties, of the triethanolamine salt of the oil soluble petroleum sulfonic acids. 2,511,250. Gulf Research & Development Co.

Desulfurizing a mixture of hydrocarbons containing organic sulfur compounds condensible with carbonyl compounds which comprises contacting a mixture of hydrocarbons and organic sulfur compounds condensible with organic carbonyl compounds with a carbonyl compound, R-CO-R' in which R is selected from the group consisting of alkyl and aryl radicals and R' is selected from the group consisting of hydrogen, alkyl radicals and aryl radicals in the presence of a catalyst consisting of a solid, inorganic oxide. 2,511,251. Socony-Vacuum Oil Co., Inc.

Deasphalting and dewaxing hydrocarbon mixtures with a deasphalting mixture comprising liquefied normally gaseous hydrocarbons and an organic carbonate. 2,511,478. Socony-Vacuum Oil Co., Inc.

Composition comprising a lubricating liquid hydrocarbon and a stable, non-corrosive neutralized phosphorus and sulfur containing reaction product obtained by reacting a phosphorus sulfide with an unsaturated cyclic ketone fraction having at least 12 carbon atoms and being an isophorone bottoms residual fraction. 2,511,630. Shell Development Co.

Extreme pressure additive for lubricant compositions consisting of the condensation product of a chlorinated hydrocarbon, selected from the class which consists of chlorinated kerosene and chlorinated wax, and a dialkyl dithiophosphoric acid alkali salt. 2,511,731. Standard Oil Development Co.

Preparing an addition agent for mineral oil lubricants by heating a xylidine, N-dimethylaniline and formaldehyde in the presence of an activated clay catalyst and recovering the condensation product. 2,511,744. Gulf Oil Corp.

Preparing an addition agent for mineral oil lubricants by heating diphenylamine, N-dimethylaniline, and formaldehyde in the presence of an activated clay catalyst. 2,511,745. Gulf Oil Corp.

Lubricant composition comprising a mineral lubricating oil, and a non-resinous condensation product of N-amylaniline, N-dimethylaniline, and formaldehyde. 2,511,746. Gulf Oil Corp.

Lubricant composition comprising a mineral lubricating oil, and a non-resinous condensation product of N-dimethylaniline and formaldehyde. 2,511,747. Gulf Oil Corp.

Lubricant composition comprising a mineral lubricating oil, and a non-resinous condensation product of an N-diethyltoluidine with formaldehyde. 2,511,748. Gulf Oil Corp.

Preparing an addition agent for mineral oil lubricants by heating an N-diethyltoluididine, N-dimethylaniline, and formaldehyce in the presence of an activated clay catalyst. 2,511,749. Gulf Oil Corp

Preparing an addition agent for mineral oil lubricants by heating N-dimethylaniline, and formaldehyde in the presence of an activated clay catalyst. 2,511,750. Gulf Oil Corp.

Lubricating grease comprising a hydrocarbon oil and a soap derived from a mixture of hydroxy fatty acid and hydrogenated fish oil fatty acid, having at least 10 carbon atoms in the molecule. 23,243. Shell Development Co.

Motor fuel consisting of saturated hydrocarbon aviation fuel, tetraethyl lead, ethylenedibromide, N,N'-di(secondary butyl)-p phenylenediamine and an organic nitrogenous base. 2,512,297. E. I. du Pont de Nemours.

Lubricating oil comprising hydrocarbon oil and a beryllium salt of a carboxylic acid containing from 6 to 18 carbon atoms, to improve the detergency of the oil. 2,512,359. Atlantic Refining Co.

Preparing an addition agent for mineral oil lubricants by adding an activated clay catalyst, methyl ether of amylphenol with N-dimethylaniline and formaldehyde to a mineral lubricating oil, heating to form a condensation product. 2,512,444. Gulf Oil Corp.

Preparing an addition agent for mineral oil lubricants by heating phenyl salicylate with N-dimethylaniline and formaldehyde in the presence of an activated clay catalyst. 2,512,445. Gulf Oil Corp.

Desulfurization of hydrocarbon oils by catalytic hydrogenation with a nickel sulfide catalyst. 2,512,570. Shell Development Co.

Slow-setting bituminous emulsion comprising water as the continuous phase, a bituminous substance emulsified therein, a stabilizing agent and a small amount, sufficient to impart substantially improved adhesion and appearance characteristics to said slow-setting bituminous emulsion, of sulfonated tall oil. 2,512,580. Stancal Asphalt & Bitumuls Co.

*Photographic**

1-cyanophenyl-3-acylamino-5-pyrazolone couplers for color photography. 2,511,231. Eastman Kodak Co.

*Polymers**

Porous filter powder comprising diatoms and a plastic coating on each individual diatom, said plastic being one of the copolymers of vinyl derivatives having approximately 85% vinyl acetate and approximately 15% vinyl chloride. 2,508,602. Sunshine Mining Co.

Alkylolamides of the acrylic acid series and their polymers. 2,508,717. General Aniline & Film Corp.

Amphoteric amides of acrylic acid and their polymers. 2,508,718. General Aniline & Film Corp.

Emulsion polymerization with a composition comprising diazo thioether-ferricyanide-mercaptan-dihydroxy aromatic compound. 2,508,734. Phillips Petroleum Co.

Lubricating grease composition comprising as the lubricant base and the major constituent a synthetic high boiling liquid polyorganosiloxane and sufficient metal soap to thicken said lubricant. 2,508,741. Texas Co.

In polymerizing propylene with gaseous BF_3 as catalyst activated by a small amount of a liquid oxygen-containing compound the improvement comprising polymerizing in a reaction zone, removing a resulting reaction mixture comprising liquid propylene polymer product, liquid C_3 hydrocarbons, the liquid oxygen-containing compound and BF_3 catalyst to a separation zone, withdrawing gaseous catalyst from the separation zone and recycling. 2,508,744. Standard Oil Development Co.

Bulk polymerization of vinyl chloride by heating vinyl chloride to polymerizing temperature in the presence of a peroxide catalyst and in the presence of a metallic salt capable of reacting with HCl. 2,508,801. Societe Anonyme des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey.

Molding composition wherein the binder contains polyvinyl acetal, polyvinyl acetate, and vinsol. 2,508,893. Radio Corp. of America.

Dihydrazide-formaldehyde resins. 2,509,183. Rohm & Haas Co.

Polymerized alkyl fumarates. 2,509,203. Standard Oil Development Co.

Manufacture of an interpolymer of an aromatic vinyl hydrocarbon and a drying oil by heating a reaction mixture consisting of an aromatic vinyl hydrocarbon, a drying oil and sulphur. 2,509,495. Sherwin-Williams Co.

Composition comprising a aqueous dispersion of a water-insoluble, film-forming linear polymer containing more than one carbalkoxy group for every 50 carbon atoms of the linear polymer chain and selected from the group consisting of homopolymers of methyl methacrylate, methyl acrylate and ethyl acrylate, and copolymers with vinyl chloride of methyl methacrylate, methyl acrylate, ethyl acrylate, dimethyl fumarate and dimethyl maleate, blended with an aqueous solution of a hydrolyzed interpolymer of ethylene and vinyl acetate. 2,509,857. E. I. du Pont de Nemours & Co.

Vinyl chloride resin plasticized with an aromatic hydrocarbon and stabilized by dypnone. 2,510,009. Socony-Vacuum Oil Co., Inc.

Heat and light stabilized resin containing polyvinyl chloride, including as a stabilizer an alkali earth metal salt of a substituted chain, aliphatic carboxylic acid, containing from 4 to 16 carbon atoms, the alpha carbon atom being free of a directly attached aryl group. 2,510,035. Advance Solvents & Chemical Corp.

Preparing a plasticized polymer by mixing an aqueous dispersion of colloidal solid polymerized tetrafluoroethylene with a substantially completely fluorinated hydrocarbon oil, coagulating while stirring to form a suspension of the colloidal polymerized tetrafluoroethylene in the fluorinated hydrocarbon oil, separating the suspension from the aqueous phase, and heating until the mixture converts to a homogeneous plastic mass. 2,510,078. E. I. du Pont de Nemours & Co.

* From Vol. 634, Nos. 4, 5; Vol. 635, Nos. 1, 2, 3.

Aerial Pollution

(Continued from page 397)

generally giving lip service to their opposition to the doctrine. Still other courts have said that a comparison of injuries is in itself insufficient reason to refuse an injunction, but that it may be considered along with other facts of the case.[19] An analysis of the cases is complicated; it is often difficult to determine whether the court is actually holding for or against the doctrine. To analyze such cases it is vital that all "borderline" factual situations and tactics be carefully studied.

In one type of case the court holds that no nuisance exists by holding that the actions of the defendant have not been "unreasonable." For example, the resident of a predominantly industrial locality cannot expect to obtain country-fresh air. Not even damages can be obtained.

In a second type of case an injunction is refused because of the existence of "equities" against the plaintiff. For example, if the plaintiff uncomplainingly watches the erection of a plant which by its nature is a nuisance, he cannot complain thereafter. But he has recourse at law for damages.

A nuisance undeniably exists, in a third type of case, but the damage to plaintiff is "trifling" and is not "irreparable." In these cases no injunction will be granted as there is an adequate remedy at law for damages. However, where the injury is substantial, this argument is inapplicable, despite the lack of proportion between the injury to defendant and plaintiff.

A fourth type of case, the doctrine of comparative injuries is applied only in cases where the public interest is affected. Thus, some cases have held that the war effort should not be impeded by an injunction.[20]

There is, however, wide acceptance of the view that comparative injuries should be considered in deciding whether a temporary injunction should be granted, pending the outcome of litigation. This is, however, no indication of the attitude of the court as regarding permanent injunction.

In addition to many variations, the exact position of a given state on the doctrine of comparative injuries is difficult to determine because relatively few cases reach the Supreme Court of the state and are printed in the Reports. Thus in most states the data from which conclusions can be drawn is meager or nonexistent. Of the thirty-two states on which cases could be found, eighteen states may be listed as opposed to the doctrine and fourteen in favor of it. Since it is more important to know how each state holds, rather than what the "majority" view is, Table 1 lists the position of each of the thirty-two states for which information has been found, together with a citation of authority. Since the entire picture is not always given by the words "For" or "Against" the doctrine, notes have been added where necessary.

In litigation there is only the hope that comparative injuries will be considered. Because of this uncertainty, it is decidedly unsafe to proceed on the assumption that the doctrine will be applied. Reliance should be placed on elimination of atmospheric pollution, rather than on the assumption that liability will be limited only to minor damages.

LEGISLATION

Within the past few years, atmospheric pollution has been legislated against in many parts of the country. Most large cities now have ordinances regulating the discharge of smoke and other atmospheric contaminants,[21] and in some cases, state legislatures have also enacted statutes. There are also several bills now before the United States Congress which would establish Federal control over atmospheric pollution. In addition, international compacts may be of importance in places where Canada and the United States adjoin.

This legislation is aimed at improvement of the enforcement of atmospheric pollution controls. This is done by setting and enforcing precise standards, wherever possible, for measurement of pollution. In addition, these enactments prohibit atmospheric pollution where it would be difficult, if not impossible, to obtain relief from the courts. For example, where many plants in an industrial area each contribute a relatively small amount of contamination, a nuisance may not exist and yet the aggregate may be very serious.

The municipal ordinance is the most widespread type of enactment. Most are modeled after, or at least resemble the Model Ordinance developed by the National Institute of Law Officers.[2] Ordinances of this type may limit the amount and density of contaminants emitted, the type of fuel to be burned and construction, addition, or alteration of fuel consuming devices. Even where the ordinance requires a business to reduce contaminant emission to a low level, and it can be shown that no appliances are available to accomplish this result, such ordinances have been upheld as constitutional.[11] It is not even necessary that the condition prohibited be a nuisance under the common law. A regulation that is reasonably necessary for the public welfare, and is not arbitrary or unduly oppressive, will be upheld where it is a valid exercise of the police power of the state.[22]

Although most atmospheric pollution ordinances are similar, they differ greatly in detail, but a brief analysis of the Model Ordinance will be of use.

The Model Ordinance prohibits the emission of smoke from any source of a density equal to or exceeding No. 2 on the Ringelmann chart,* declaring such emission to be a public nuisance.

Since the ground concentration is independent of particle density at the stack exit but proportional to the mass rate of emission,[6] smoke density is not an accurate measure of atmospheric pollution. For example, if the stack gases are diluted, the smoke density reading will be reduced without diminishing atmospheric pollution. This is not recognized in the Model Ordinance nor in most municipal ordinances, although a few attempt to prevent intentional dilution of stack gases for this purpose. In addition, it is not generally realized that optical density depends not only on particle density, but also on thickness of the layer observed, i.e., on stack diameter.[23] No direct provisions are made in the ordinances to regulate mass rate of emission of smoke, nor to give credit for taller stacks.

While this method of controlling smoke emission is very crude, it is effective in most cases because of its simplicity. Exceptions to the allowable smoke density are made in the case of private residences housing no more than two families. Other users are also excepted for short periods of time to allow for cleaning fire boxes or starting the fire. The Model Ordinance also prohibits the use of fuel containing more than 20% volatile matter. Certain exceptions are permitted, by which the use of other fuel and fuel-burning equipment are authorized

* The Ringelmann chart consists of a series of numbered rectangles containing ruled squares. The higher numbers have thicker lines, so that a greater proportion of the rectangle is black. In use, the chart is held at a specified distance so that it appears to be a homogeneous shade of gray—the depth of the shade increasing from white to black as the number increases.

(Turn to page 512)

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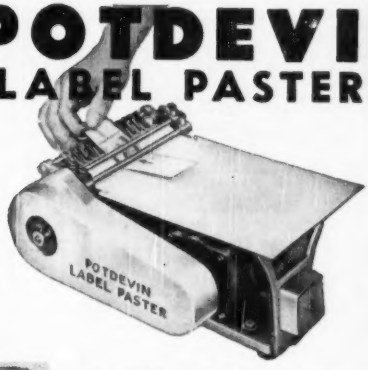

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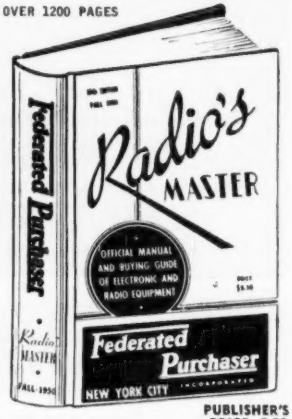

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Aerial Pollution

(Continued from page 506)

upon establishment of the fact that the other provisions of the ordinance (i.e., smoke density) will be met. In addition, the installation or alteration of any fuel-burning equipment must first be approved by officials.

The emission of contaminants other than smoke, including "soot, cinders, noxious acids, fumes and gases" under such circumstances as to "endanger the health, comfort and safety of any person or of the public" is also declared to be a public nuisance. No specific rule is offered in these cases, so that this section of the Ordinance is merely declaratory of the common law.

The Superintendent of Smoke Prevention is empowered by the Model Ordinance to bring court action to enforce the law. A Board of Appeals hears appeals from his decisions. Although legal action before the courts is necessary to enforce any action, the court will accept the findings of fact of the Superintendent or the Board of Appeals if supported by evidence. The court limits its inquiry to questions of law, rather than of fact. Thus, in most cases, the decision of the Superintendent or Board of Appeals is of crucial importance, the court merely imposing the proper penalty on the violator. Penalties are prescribed in the ordinance as "not to exceed $200 for each violation," and imprisonment "not to exceed 30 days." This provision varies in detail in the actual ordinances. Offenses on separate days are deemed separate offenses. The ordinances also declare it to be a misdemeanor to interfere with the Superintendent. Thus, he cannot be denied access to the premises of a fuel consumer for inspection or observation.

Broadly speaking, it may be said that ordinances and statutes largely supersede the common law or public nuisance, but do not affect the common law of private nuisance.

If the legislature declares a certain practice to be a public nuisance, this determination is respected by the courts, provided the statute is not void for arbitrariness. Thus, a practice that would not be a nuisance under the common law will still be abatable in the manner prescribed by the statute. Conversely, if a particular practice is permitted by the statute, it will in general not be held to be a public nuisance, despite the fact that it would have been a public nuisance[24] under the common law.

According to some courts, practices which the legislature permits can no longer be **private** nuisances. The weight of authority is, however, to the contrary. Thus, an action for private nuisance can still be brought, even if the practice is permitted by the statute and is not deemed to be a public nuisance[25] as the public cannot take away private property or property rights without condemnation proceedings and purchase.

Nor should it be assumed that replacement of the common law of public nuisance in atmospheric pollution cases by statutes and ordinances is complete. Statutory remedies for the abatement of nuisances do not as a rule, supersede the existing common law remedies.[26] Thus, an individual peculiarly affected by a practice which under the statute is a public nuisance may sue for its abatement, if the official designated by the statute refuses to do so.[27] Thus, it is not safe to rely on the leniency of the official administering the ordinance or statute, unless he is clearly acting within his authority. For example, if he extends the period of grace beyond the time allowed in the ordinance or statute, it is possible for an action to be brought by an aggrieved private person. Proper drafting of the statute should avoid this difficulty in a state statute at least. In the case of an ordinance it would seem to depend on the powers granted the municipality in its charter.

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Tonnage Ozone

(Continued from page 389)

recently the cost of ozone equipment was too high to be competitive, but with present prices this application now appears favorable.

Ozone is being used in Italy by the Stabilimenti Tessili Italiani Co. for the bleaching of cotton. The cotton is hung on skeins in bleaching chambers through which ozonized air is passed. The advantages are an excellent and uniform bleach without weakening of the fibers and without the tendency for the yarn to yellow on aging.

Oils, esters and many organic solvents have been successfully decolorized in small-scale tests. Water with very high (natural) color has been decolorized by the use of ozone alone.

CATALYST

Walthall has also described the use of ozone as a catalyst or promoter in the air oxidation of SO_2 to SO_3 using a manganese catalyst. Here small amounts of ozone greatly enhance the oxidation.

An oxidation process involving the use of ozone as a catalyst or promotor in the air oxidation of methane to formaldehyde was developed and carried through the pilot plant stage in Germany by the Hibernia Company at Herne.

ORGANIC REACTIONS

The ozonization reaction (where ozone reacts with an unsaturated hydrocarbon) has long been used in the organic laboratory as a tool in the solution of structural problems by cleavage of double bonds.

This reaction has also been used commercially in the preparation of anisic aldehyde from anethole, piperonal from isosafrole, and vanillin from isoeugenol.

More recently the ozonization reaction has been utlized commercially in the preparation of hormones. In one such synthesis, stigmasterol is ozonized as the acetate dibromide to form acetoxy - bisnorcholenic acid, from which progesterone is eventually synthesized.

Applications such as these have required only relatively small quantities of ozone and the cost of the oxidant has been a secondary consideration. Working with expensive basic materials and final products, factors of convenience and yields have overshadowed cost.

Application of ozone in similar reactions to many cheap unsaturated compounds such as fatty acids and petroleum hydrocarbons offers a field of development whereby a whole series of chemicals of potential value as solvents and intermediates might be synthesized.

OZONIDES

The ozonides themselves offer intersting possibilities for development. As active-oxygen chemicals, many should find use as bleaching agents, polymerization catalysts, germicides and oxidizing agents.

These are just a few of the possible commercial uses for ozone as it passes at mid-century from the confines of the laboratory to the broader fields of industrial chemistry. Laboratory research men working with ozone are already convinced that the next decade will bring forth even broader applications, for ozone as yet undreamed of by practical production men.

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Technical Intelligence Unit

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The first digit of an SPIA subject-code number corresponds to a major division of the solid propellant field. The second digit in most cases pertains to a particular technological aspect of the first-digit subject, and this in turn is subdivided by use of a third digit. This gives 1110 possible combinations of 1, 2, or 3 digits in a decimal system. Minor changes in this list of subjects can easily be made and are being made whenever the need arises.

This method of collecting all the literature pertaining to one field into a group by itself serves to make the personnel working with it experts in the field, and able to serve the researchers' demands much better than a system wherein all fields are covered at one time. The specialized unit technical intelligence technique should be adaptable to the needs of many groups in other fields.

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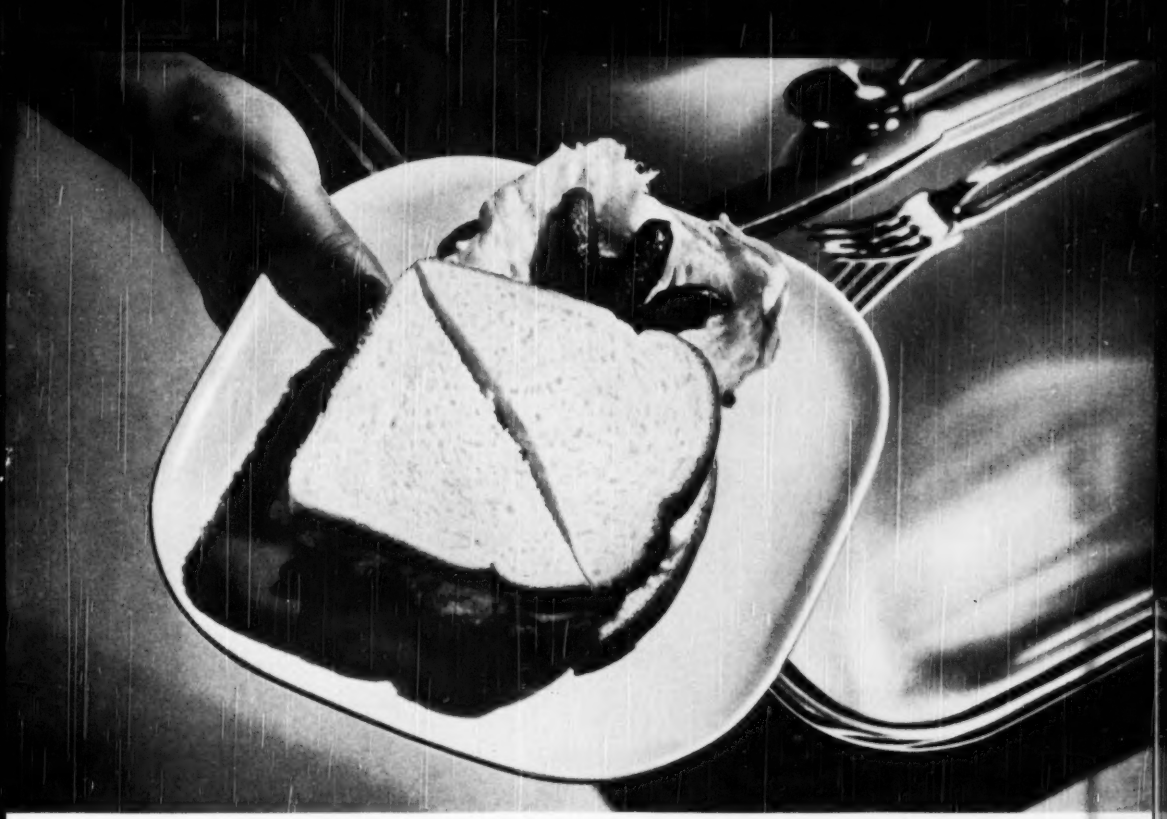

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